

"MULTUM IN PARVO."

HANDY NOTES AND QUERIES.

A MANUAL OF USEFUL INFORMATION,

OF ESPECIAL IMPORTANCE TO DEALERS IN

HARDWARE, STOVES AND TINWARE,

MACHINISTS',

GAS-FITTERS' AND PLUMBERS' MATERIALS

AS WELL AS THE VARIOUS WORKERS IN USEFUL METALS,

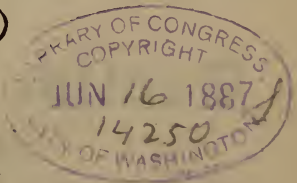
INCLUDING ALSO

A NUMBER OF ADDITIONAL PAGES, GIVING INFORMATION OF A
MORE GENERAL CHARACTER.

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Henry Hopkins

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85 Chambers St.
1887.



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TO HARDWARE MANUFACTURERS.

THE "NEAR-BY" EDITION FOR 1888-9 of

HOPKINS' HANDY NOTES AND QUERIES.

The next Edition of this Popular Advertising Medium will be the "Near-By" for 1888-9, which will be published about April 1, 1888, and consist for the first time of

10,000 COPIES.

which upon publication will be distributed gratuitously among 6000 Dealers classed as "HARDWARE" and 4000 Dealers classed as "STOVES, TIN" and "HOUSE-FURNISHING," in the following "NEAR-BY" States: **Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Maryland.**

TERMS FOR ADVERTISING:

TWENTY DOLLARS A PAGE.

(Half Pages, Half Price.)

PAYABLE UPON PUBLICATION.

The Publishers of this original medium for reaching the Hardware Trade are practical salesmen with a continuous New York experience of 30 years connection with the business, which warrants the assurance that the manufacturers whose patronage is bestowed upon "HANDY NOTES AND QUERIES" may ultimately receive, even through the efforts of the publishers alone, a sufficient remuneration to more than compensate them for the nominal outlay incurred in the advertising solicited.

"Trade Journals," reaching only a limited number of actual subscribers, are not alone desirable mediums for advertising. In our publication we promise that a copy will reach the hands of every dealer in "Hardware" in the States mentioned who possesses a commercial rating; and the thoroughness of such a canvass in a publication like ours, which is never thrown away, can readily be understood by intelligent advertisers.

Every second year only we publish an Edition to be sent gratuitously through the same States; so that for the ensuing two years advertisers may feel assured their announcements will be within reach, on the desks of

TEN THOUSAND DEALERS

whose patronage they are desirous of obtaining.

In estimating the value of this high-class circulation, remember it goes only to business men or firms, and differing entirely from a newspaper, is always retained and suspended for ready reference beside the desk of the recipient.

Yours truly,

HENRY HOPKINS & CO.,

85 Chambers St., New York.

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The Goods produced by any of the Hardware Manufacturers Represented in this Publication can be procured at the Manufacturers' Lowest Prices, by sending your Orders to this address:

HENRY HOPKINS,

P. O. Box 2585,

NEW YORK.

REPRESENTING

QUACKENBUSH, TOWNSEND & Co.,

Manufacturers and Wholesale Dealers in

H A R D W A R E,

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Norwich Lock Manufacturing Co.

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"Wide Awake" Axes,

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Silver Clipper Scythes,

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NEW YORK.

PREFACE.

This Publication has received at all hands a cordial welcome and grateful preservation. The contents represent months of research and solicitation, of patient observation and incessant labor; and although the Book was originally compiled for Personal use, the knowledge that it would be found useful to EVERY dealer in Hardware and Metals, has caused its publication and extended distribution under the advertising patronage of so many Representative Houses.

Its future value can only be assured by making those Advertisers believe that it fills its mission of usefulness, and is kept by the Dealer who receives it, and who, in his quest for information corresponds with its many Advertisers, asking them for Catalogues and quotations; at the same time increasing the value of "Handy Notes and Queries," by stating it was among its pages the advertisement was seen which suggested the application.

The necessity for a Handy Book of Reference similar to this has been manifest for a great many years; and that such a compilation would prove of undoubted utility, has been often experienced by dealers in the various articles to which this work refers.

It is no doubt true that many books have been already published, which, singly or collectively, contain nearly all the items of information carefully embodied in this, but most of them are works of limited circulation, not readily obtained, and frequently costing a price that places them beyond the reach of many dealers most apt to need the information.

This work has been compiled from a multitude of sources with a great degree of care, and the information herein contained will be found quite reliable, and from the scarcity of similar publications, should naturally recommend its careful preservation.

By comparison with Haswell, Trautwine and other authorities, these tables will be more easily understood by practical mechanics, and consequently found susceptible of an immediate simple demonstration without going thro' prescribed forms of computation, natural enough to those whose education has been of a technical character, but thoroughly bewildering to most of us who have "risen from the ranks."

Wherever possible I have refrained from following the "Haswell" method of expressing all sizes by decimal notation; thinking it simpler to say 3-16, instead of .1875; 5-16, instead of .3125; &c., the desired information being more easily obtained without the necessity of using mentally an unfamiliar process of reduction.

My principal object has been to be of some service to those following my own business, feeling confident from the assistance I have myself so frequently received, by having these "Handy Notes" within reach will also be appreciated by them. Thus they may often save many moments of anxious worry over unexpected problems that may occur in every day work.

H. H.

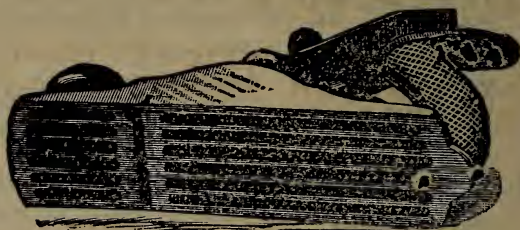
TOWER & LYON,
MANUFACTURERS OF
SPECIALTIES IN HARDWARE,

NOS. 95 CHAMBERS ST. & 77 READE ST.

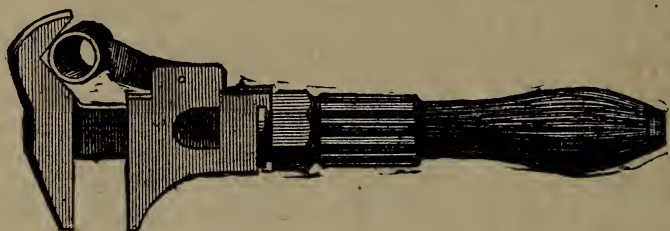
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PLANES



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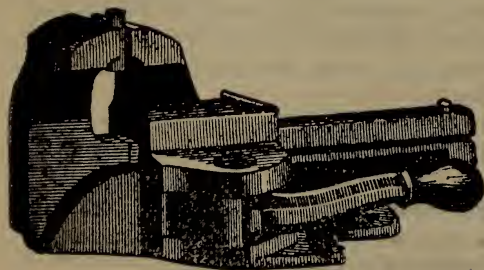
CHAMPION SCREW-DRIVERS.



SOLE MANUFACTURERS

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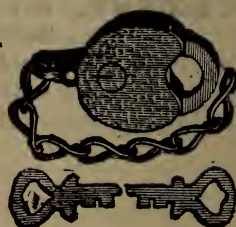
**STEPHENS PATENT
VISES.**



Brass and Iron and Scandinavian

PADLOCKS,

Police Equipments, Lanterns, &c.



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PERFECTION.

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For the Convenience of Business Men
IN ALL LINES OF TRADE,
BUT ESPECIALLY THE HARDWARE DEALER.

This Book was not offered to the Public until October, 1883, but thousands who are now using it can testify to its usefulness.

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BUSHNELLS' PRICE BOOK is a neat, substantially bound book of 200 pages, made of first-class stock, conveniently and tastefully indexed, handsomely ruled and headed. It is manufactured for the publisher by one of the best blank book manufacturers in New York, and no expense has been spared to make it the finest book in the market, the neatness and convenience of which will commend it at once.

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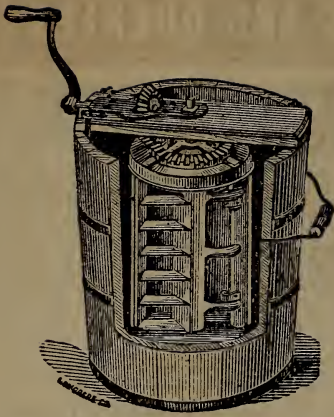
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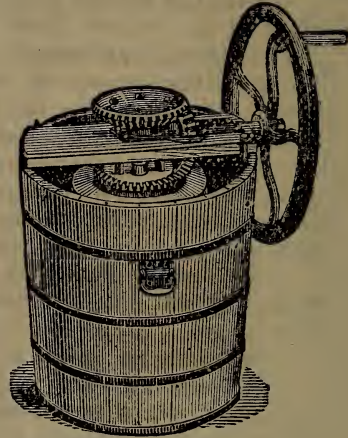
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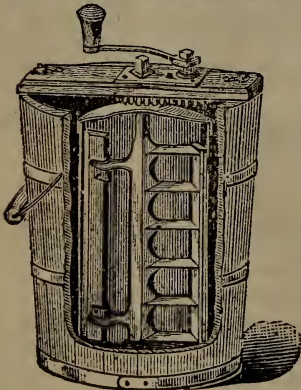
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*Easily Operated, Simple in Construction,
Rapid and Efficient in Work, Well
Made, Strong and Durable.*

All the Castings are Galvanized or Tinned; Tubs of WHITE CEDAR, with Galvanized Hoops. Pine Tubs that require to be chemically filled to render waterproof are not used in the Packer Freezers. The beater, to which is attached Deflectors and Lifters, has self-adjusting vibratory Scraping-Bar. The mechanical arrangements guarantee the Freezing of Cream, Fruits, Ices, &c., in the shortest time and most satisfactory manner.



CHAS. W. PACKER'S MODEL ICE CREAM FREEZER



Is offered as possessing the advantages of higher-priced Freezers at less cost, the simplicity of construction admitting a lower price list. They are made from the best qualities of materials, including White Cedar Pails with Galvanized Hoops, Galvanized and Tinned Castings, extra grade Tin Plate, &c. The Can has Cast-iron Cover and Bottom, and may be revolved after the Dasher has been removed. The Dasher has self-adjusting scraping bar, and is designed with special reference to rapid freezing.

**C. W. PACKER, Manufacturer,
PHILADELPHIA.**

For Sale by Wholesale Dealers in all of the Principal Cities.

BUSINESS LAW IN DAILY USE.

The following compilation of business law contains the essence of a large amount of legal verbiage :

If a note is lost or stolen, it does not release the maker ; he must pay it, if the consideration for which it was given and the amount can be proven.

Notes bear interest only when so stated.

Principals are responsible for the acts of their agents.

Each individual in a partnership is responsible for the whole amount of the debts of the firm, except in cases of special partnership.

Ignorance of the law excuses no one.

The law compels no one to do impossibilities.

An agreement without consideration is void.

A note made on Sunday is void.

Contracts made on Sunday cannot be enforced.

A note by a minor is void.

A contract made with a minor is void.

A contract made with a lunatic is void.

A note obtained by fraud, or from a person in a state of intoxication, cannot be collected.

It is a fraud to conceal a fraud.

Signatures made with a lead pencil are good in law.

A receipt for money is not always conclusive.

The acts of one partner bind all the rest.

"Value received" is usually written in a note, and should be, but is not necessary. If not written it is presumed by the law, or may be supplied by proof.

The maker of an "accommodation" bill or note (one for which he has received no consideration, having lent his name or credit for the accommodation of the holder) is not bound to the person accommodated, but is bound to all other parties, precisely as if there was a good consideration.

No consideration is sufficient in law if it be illegal in its nature.

Checks or drafts must be presented for payment without unreasonable delay.

Checks or drafts should be presented during business hours, but in this country, except in the case of banks, the time extends through the day and evening.

If the drawee of a check or draft has changed his residence, the holder must use due or reasonable diligence to find him.

If one who holds a check as payee or otherwise, transfers it to another, he has a right to insist that the check be presented that day, or, at farthest, on the following day.

A note indorsed in blank (the name of the indorser only written) is transferable by delivery, the same as if made payable to bearer.

If the time of payment of a note is not inserted, it is held payable on demand.

NORTHAMPTON CUTLERY CO.,

N. Y. Salesroom, 122 Chambers St., Only.
Office and Factory, Northampton, Mass.

MANUFACTURERS OF
SUPERIOR TABLE CUTLERY
OF EVERY DESCRIPTION.



With Cocoa, Ebony, Bone, Rubber, Celluloid, Ivory
and Plated Handles, including an
Assortment of

CARVERS and PATENT GUARD FORKS

of the latest and most approved designs.

FRENCH COOKS' KNIVES

Tempered and ground especially for Professional use.

BUTCHER, HUNTING, STICKING & SKINNING KNIVES

In all the usual styles of perfect finish and guaranteed quality.

A full assortment of these very desirable Goods
can be obtained from

**ANY OF THE LEADING JOBBING HOUSES IN THE
UNITED STATES.**

BUSINESS LAW IN DAILY USE.----Continued.

The time of payment of a note must not depend upon a contingency. The promise must be absolute.

A bill may be written upon any paper, or substitute for it, either with ink or pencil.

The payee should be distinctly named in the note, unless it is payable to bearer.

An indorsee has a right of action against all whose names were on the bill when he received it.

If the letter containing a protest of non-payment be put into the post office, any miscarriage does not affect the party giving notice.

Notice of protest may be sent either to the place of business or of residence of the party notified.

The holder of a note may give notice of protest either to all the previous indorsers or only to one of them; in case of the latter he must select the last indorser, and the last must give notice to the last before him, and so on. Each indorser must send notice the same day or the day following. Neither Sunday or legal holiday is to be counted in reckoning the time in which notice is to be given.

The loss of a bill or note is not sufficient excuse for not giving notice of protest.

If two or more persons as partners are jointly liable on a note or bill, due notice to one of them is sufficient.

If a note or bill is transferred as security, or even as payment of a pre-existing debt, the debt revives if the bill or note be dishonored.

An indorsement may be written on the face or back.

An indorser may prevent his own liability to be sued by writing "without recourse," or similar words.

All claims which do not rest upon a seal or judgment must be sued within six years from the time when they arise.

Part payment of a debt which has passed the time of statutory limitation revives the whole debt, and the claim holds good for another period of six years from the date of such partial payment.

A verbal promise to pay, made without condition, is generally held as sufficient to revive a claim otherwise shut out by the law of limitation.

If, when a debt is due, the debtor is out of the State, the "six years" do not begin to run until he returns. If he afterward leave the State, the time forward counts the same as if he remained in the State.

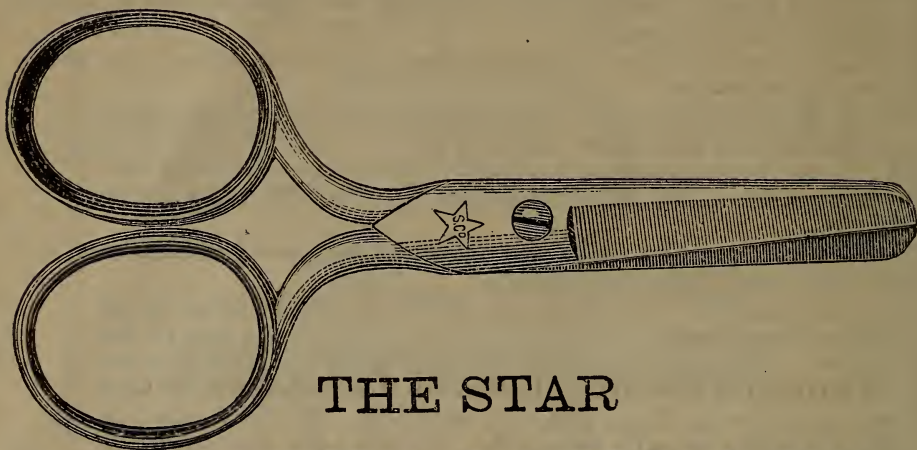
An oral agreement must be proved by evidence. A written agreement proves itself. The law prefers written to oral evidence because of its precision.

No evidence may be introduced to contradict or vary a written contract; but it may be received in order to explain it, when such contract is in need of explanation.

Wm. Schollhorn & Co.

NEW HAVEN, CONN.

MANUFACTURERS OF



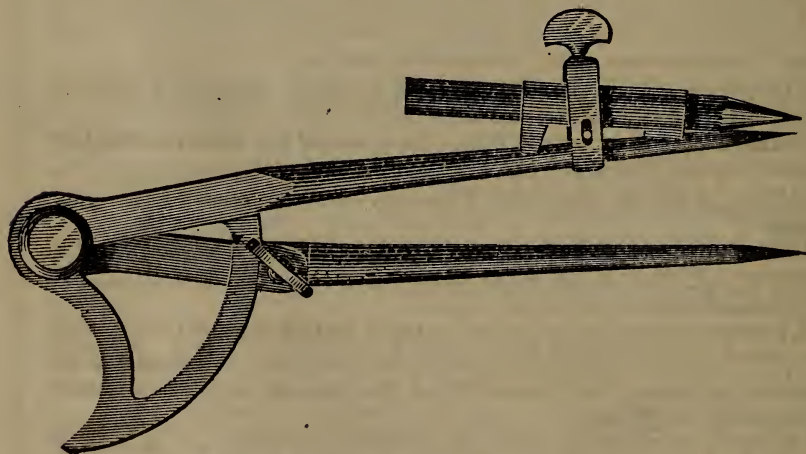
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Full Line of Straight and Bent Trimmers, Bankers' and Paper Shears, Barbers' Shears, Ladies, Embroidery Pocket and Buttonhole Scissors.

WARRANTED SUPERIOR QUALITY.

FULL NICKEL-PLATED.



THE EXCELSIOR DIVIDER AND PENCIL HOLDER.

The Divider points are made of STUBS' STEEL WIRE. The Pencil Holder can be attached to any Divider.

WRITE FOR CATALOGUE AND PRICE LIST.

HOPKINS' HANDY NOTES AND QUERIES.

Bills of Exchange, Drafts, Acceptances.

A Bill of Exchange or Draft is an order drawn by one person or firm upon another, payable either at sight or at a stated future time.

It becomes an "Acceptance" when the party upon whom it is drawn writes across the face "Accepted," and signs his name thereto, and is negotiable and bankable the same as a note, and subject to the same laws.

In many States both Sight and Time drafts are entitled to three days grace, the same as notes; but if made in form of a bank check, "pay to," without the words "at sight," it is payable on presentation without grace.

Demand Notes are payable on presentation without grace, and bear legal interest, after a demand has been made, if not so written. An endorser on a demand note is holden only for a limited time, variable in different States.

A Negotiable Note must be made payable either to bearer, or be properly endorsed by the person to whose order it is made. If the endorser wishes to avoid responsibility, he can endorse "without recourse."

A Joint Note is one signed by two or more persons, who each become liable for the whole amount.

Three Days' Grace are allowed on all time notes, after the time for payment expires; if not then paid, the endorser, if any, should be legally notified, to be holden.

Foreign Exchange, Value of U. S. Coins, etc.

The value of One Pound Sterling or an English Sovereign, compared with old U. S. coins, is \$4.44, but Congress has, from time to time, reduced the weight and purity of U. S. coins, making their value as metals less than their value as coins, and has established the present legal value of a Pound Sterling at \$4.84. Exchange is based on the old or nominal value of a Pound, so that when exchange is said to be at 9 per cent. premium, it is then at par value; when below 9 per cent., it is below par; and when above 9 per cent., above par, etc.

Copartnerships.

Partnerships may be either general or special. In general partnerships, money invested ceases to be individual property. Each member is made personally liable for the whole amount of debts incurred by the company. The company is liable for all contracts or obligations made by individual members.

Special Partners are not liable beyond the amount contributed.

A person may become a partner by allowing people generally to presume that he is one, as, by having his name on the sign, or parcels, or in the bills used in the business.

A share or specific interest in the profits or loss of a business, as remuneration for labor, may involve one in the liability of a partner.

In case of Bankruptcy, the joint estate is first applied to the payment of partnership debts, the surplus only going to the creditors of the individual estate.

A Dissolution of partnership may take place under express stipulations in the articles of agreement, by mutual consent, by the death or insanity of one of the firm, by award of arbitrators, or by court of equity in cases of misconduct of some member of the firm.

A partner signing his individual name to negotiable paper, which is for the use of the partnership firm, binds all the partners thereby. Negotiable paper of the firm, even though given on private account by one of the partners, will hold all the partners of the firm when it passes into the hands of holders who are ignorant of the fact attending its creation.

Partnership effects may be bought and sold by a partner; he may make contracts; may receive money; endorse, draw, and accept bills and notes; and while this may be for his own private account, if it apparently be for the use of the firm, his partners will be bound by his action, provided the parties dealing with him were ignorant of the transaction being on his private account; and thus representation or misrepresentation of a partner, having relation to business of the firm, will bind the members in the partnership.

In case of Death, the surviving partners must account to the representatives of the deceased.

MORE LIGHT. Latest Improved GAS, OIL, AND GASOLINE

STREET LAMPS,

New "SOLAR REGENERATIVE" Gas-Burner

AN ECONOMICAL SUBSTITUTE FOR ELECTRIC LIGHT,

[LITTLE] [GIANT] [LIGHT] [INCREASER]

An Attachment that will INCREASE the LIGHT of a COMMON KEROSENE LAMP
MORE THAN FOUR FOLD.

SENT BY MAIL UPON RECEIPT OF 60C.

Illustrated Circulars and Prices furnished upon application, with Freight paid to any point
on Trunk Line of Railroad, on liberal orders.

ALTA MFG. CO. 175 Washington St., Boston, Mass.

HOTCHKISS' IMPROVED RAT-KILLER

Manufactured by
E. S. HOTCHKISS,
BRIDGEPORT, CONN..
Manufacturer of Hotchkiss' Patent Steel Mouse Trap
AND HARDWARE SPECIALTIES.

SEND FOR ILLUSTRATED LIST.
SAMPLE RAT TRAP, 25 cents. } To Dealers.
" MOUSE " 15 " }



Patented Dec. 26, 1886.

THE PUBLISHERS having made every effort to make
this Book an acceptable gift to the Dealer to whom it is
sent, would be pleased to receive in reply a Postal Card
acknowledgment of its having safely arrived.

HOPKINS' HANDY NOTES AND QUERIES.

Simple Method of Calculating Interest.

We take 6 per cent. as basis for calculating all rates.
Multiply the amount by number of days and divide by 6000; or, which is the same thing, multiply by number of days, remove the decimal point three figures to the left and divide by 6. This gives the interest at 6 per cent.

For	2 per cent.	take	one-third.
For	3 per cent.	take	one-half.
For	4 per cent.	deduct	one-third.
For	5 per cent.	deduct	one-sixth.
For	7 per cent.	add	one-sixth.
For	8 per cent.	add	one-third.
For	9 per cent.	add	one-half.
For	10 per cent.	add	two-thirds.

The following example shows the simplicity :

Interest on \$950.40 for 212 days.			
950.40	Interest @ 6 per cent,		33.58
212	" " 2 " "	$\frac{1}{2}$ of 33.58	11.19
	" " 3 " "	$\frac{1}{3}$ of 33.58	16.79
190080			
95040		33.58	
190080	" " 4 " "	$\frac{1}{3}$ off 11.19	22.39
6) 201.484.80		33.58	
33.58	" " 5 " "	$\frac{1}{5}$ off 5.59	27.99
		33.58	
	" " 7 " "	add $\frac{1}{5}$ 5.59	39.17
		33.58	
	" " 8 " "	add $\frac{1}{5}$ 11.19	44.77
		33.58	
	" " 9 " "	add $\frac{1}{5}$ 16.79	50.37
		33.58	
	" " 10 " "	add $\frac{2}{5}$ 22.38	55.96

ANY rate can be calculated upon the same principle.

Contributed by Jesse Lee and Son, Philadelphia, Pa.

Time at which Money Doubles at Interest.

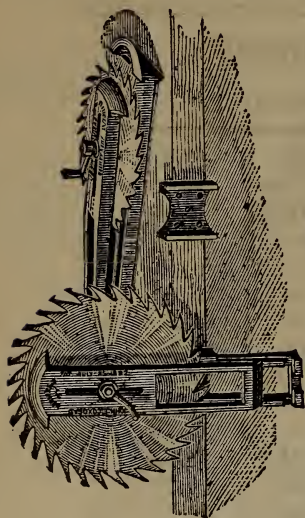
Rate per cent.	Simple Interest.	Compound Interest.
2.....	50 years.	35 years 1 day.
2½.....	40 years.	28 years 26 days.
3.....	33 years 4 months.	23 years 164 days.
3½.....	28 years 208 days.	20 years 54 days.
4.....	25 years.	17 years 246 days.
4½.....	22 years 81 days.	15 years 273 days.
5.....	20 years.	15 years 75 days.
6.....	16 years 8 months.	14 years 327 days.
7.....	14 years 104 days.	10 years 89 days.
8.....	12½ years.	9 years 2 days.
9.....	11 years 40 days.	8 years 16 days.
10.....	10 years.	7 years 100 days.

ONE DOLLAR LOANED 100 YEARS at Compound Interest would amount to the following sum :

1 per cent.....	\$2.75	12 per cent.....	\$84,675.00
3 " ".....	19.25	15 " ".....	1,174,405.00
6 " ".....	340.00	18 " ".....	15,145,207.00
10 " ".....	13,809 00	24 " ".....	2,551,799,404.00

Coxhead's Combined Saw Vise and Set.

PATENTED JULY 25, 1882.



No. 2—For Hand Saws—Will hold to file and set any saw, from the smallest to the largest. In using it for *setting* keep the bolt up against the back of the saw, to prevent any slipping back. The Anvil has four bevels. The jaws are all planed.

Price, \$1.50.
Weight of No. 2, 8 lbs.

No. 3—For Hand, Band or Scroll Saws—Will hold any size of Band or Hand Saw. This is intended for shop use, being too heavy to carry about.

Price, \$2.25.

Improved Saw Vise—Same as Nos. 2 and 3, but without the Set.
Price, 50c. and \$1.25.

3 B—This Tool fitted up with Guides for filing and setting Band Saws on the frame.

Price, \$2.50.

Weight of No. 3, 13 lbs.

No. 4—This size will hold Circular Saws from 7 to 18 inches in diameter. By taking off the front Jaw the bolt can be moved to suit any size between. **Price, \$3.50.** **No. 5—Will hold any size from 7 to 26 inches in diameter, for filing and setting.** **Price, \$4.50.**

No. 6—From 5 to 10 inches. **Price, \$2.50.**

No. 4, weight 23 lbs.

No. 5, weight 35 lbs.

These Tools are very efficient and highly prized by all who use them.

Send for Catalogue and Trade Discount.

MANUFACTURED BY

JOHN F. COXHEAD, Poughkeepsie, N. Y.

FOR SALE BY **QUACKENBUSH, TOWNSEND & CO.,**
85 CHAMBERS ST., NEW YORK.



PATENTED MAY 19, 1885.

The object of this **DIAMOND POINT** can be readily seen, in that it prevents the SET from slipping from the head of the nail while in use, thus saving in many cases some valuable piece of work.

It is fast taking the place of every other Nail Set.

Once seen, Mechanics will have no other.

These Sets are carefully made from the Best Quality of Tool Steel. The Points are turned and thoroughly tempered, and will not break off.

EACH SET FULLY WARRANTED.

The Trade Supplied. Put up in Boxes 1 Dozen, 1-4 Gross and 1 Gross. Assorted Sizes. Prices and Terms upon application. Manufactured only by

THE EDWARD STORM SPRING CO., Limited,
POUGHKEEPSIE, N. Y.

HOPKINS' HANDY NOTES AND QUERIES.

Rate of Annual Income of Investments,

PAR VALUE BEING \$100, BEARING INTEREST AT

Price paid.	5%	6%	7%	8%	10%
\$50	10.00	12.00	14.00	16.00	20.00
55	9.09	10.90	12.72	14.55	18.18
60	8.33	10.00	11.66	13.33	16.66
65	7.69	9.23	10.76	12.30	15.38
70	7.14	8.57	10.00	11.42	14.28
75	6.66	8.00	9.33	10.66	13.35
80	6.25	7.50	8.75	10.00	12.50
82½	6.06	7.27	8.48	9.69	11.12
85	5.88	7.05	8.23	9.41	11.76
87½	5.71	6.85	8.00	9.14	11.42
90	5.55	6.66	7.77	8.88	11.11
92½	5.40	6.48	7.56	8.64	10.80
95	5.26	6.31	7.36	8.42	10.52
96	5.20	6.25	7.29	8.33	10.41
97	5.15	6.18	7.21	8.24	10.30
97½	5.12	6.15	7.17	8.20	10.25
98	5.10	6.12	7.14	8.16	10.20
99	5.05	6.06	7.07	8.08	10.10
100	5.00	6.00	7.00	8.00	10.00
101	4.95	5.94	6.93	7.92	9.90
102	4.90	5.88	6.86	7.84	9.80
103	4.85	5.82	6.79	7.76	9.70
104	4.80	5.76	6.73	7.69	9.61
105	4.76	5.71	6.66	7.61	9.52
110	4.54	5.45	6.36	7.27	9.09
115	4.34	5.21	6.08	6.95	8.69
120	4.16	5.00	5.83	6.66	8.33
125	4.00	4.80	5.60	6.40	8.00
130	3.84	4.61	5.38	6.15	7.69
135	3.70	4.44	5.18	5.92	7.40
140	3.57	4.28	5.00	5.71	7.14
145	3.44	4.13	4.82	5.51	6.89
150	3.33	4.00	4.66	5.33	6.66

Interest Rules.

FOUR PER CENT.—Multiply the principal by the number of days to run; separate the right hand figure from product, and divide by 9.

FIVE PER CENT.—Multiply by number of days, and divide by 72

SIX PER CENT.—Multiply by number of days; separate right hand figure, and divide by 6.

SEVEN AND THREE-TENTHS PER CENT.—Multiply by number of days, and double the amount so obtained. On \$100 the interest is just two cents per day.

EIGHT PER CENT.—Multiply by number of days, and divide by 45.

NINE PER CENT.—Multiply by number of days; separate right hand figure, and divide by 4.

TEN PER CENT.—Multiply by number of days, and divide by 36.

TWELVE PER CENT.—Multiply by number of days; separate right hand figure, and divide by 3.

BISSELL CARPET SWEEPER CO.

FACTORY:

GRAND RAPIDS, MICH.

The Largest and Only
Exclusive Manufacturers of

Carpet Sweepers in
the World

Manufacturing over Twenty Different Styles and embodying every desirable feature known under 35 Patents and Patents Pending.

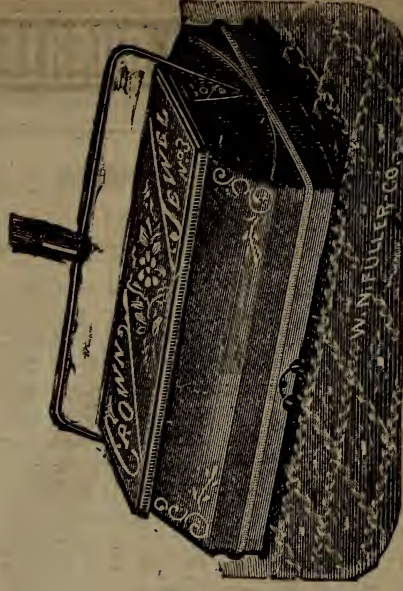


Bissell, No. 5.—Opening at the top. Sweeps closer to the sur-base than any other Sweeper.

The motive power in all of the Sweepers of our manufacture consists in the Friction Wheel, which is conceded to be the only Effective and Positive Motive Power ever produced in Sweepers. Being exclusive manufacturers of

CARPET SWEEPERS

we are in a position to meet any competition that may arise.



Crown Jewel, No. 3.—A strong, durable and finely-finished four-wheeled Sweeper.

We are constantly adding new improvements to our several Brands and invite your inquiries from time to time for Price-Lists and Descriptive Circulars.

All Sweepers of our Manufacture
are Warranted.



"THE GRAND RAPIDS."
The most Popular Sweeper in the World.

SEND FOR PRICE-LIST AND DESCRIPTIVE CIRCULARS.

HOPKINS' HANDY NOTES AND QUERIES.

Total Value of Articles by the Piece, Reckoned from 1 to 1 Dozen.

1.....	8½	10½	12½	14½	16½	18½	20½	22½	25	29½	31½	33½	35½	37½	39½	41½	43½	45½	47½	50
2.....	17	21	25	29	33	38	42	46	50	58	63	67	71	75	79	83	88	92	96	1.00
3.....	25	31	38	44	50	56	63	69	75	88	94	1.00	1.06	1.13	1.19	1.25	1.31	1.38	1.44	1.50
4.....	33	42	50	56	67	75	83	92	1.00	1.17	1.25	1.33	1.42	1.50	1.58	1.67	1.75	1.83	1.92	2.00
5.....	42	52	63	73	83	94	1.04	1.15	1.25	1.46	1.56	1.67	1.77	1.88	1.98	2.08	2.19	2.29	2.40	2.50
6.....	50	63	75	88	1.00	1.13	1.25	1.38	1.50	1.75	1.88	2.00	2.13	2.25	2.34	2.50	2.63	2.75	2.87	3.00
7.....	58	73	88	1.02	1.17	1.31	1.46	1.60	1.75	2.04	2.19	2.33	2.48	2.63	2.77	2.92	3.06	3.21	3.35	3.50
8.....	67	83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.50	3.67	3.83	4.00
9.....	75	94	1.13	1.29	1.50	1.69	1.88	2.06	2.25	2.63	2.81	3.00	3.19	3.38	3.56	3.75	3.94	4.13	4.31	4.50
10.....	83	1.04	1.25	1.46	1.67	1.88	2.08	2.29	2.50	2.92	3.13	3.33	3.54	3.75	3.96	4.17	4.38	4.58	4.79	5.00
11.....	92	1.15	1.38	1.60	1.83	2.06	2.29	2.52	2.75	3.21	3.44	3.67	3.89	4.13	4.23	4.58	4.81	5.04	5.27	5.50
12.....	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00

1.....	52½	54½	56½	58½	60½	62½	64½	66½	68½	70½	72½	75	77½	79½	81½	83½	87½	91½	95½	1.00
2.....	1.04	1.08	1.13	1.17	1.21	1.25	1.29	1.33	1.38	1.42	1.46	1.50	1.54	1.58	1.63	1.67	1.75	1.83	1.92	2.00
3.....	1.56	1.63	1.69	1.75	1.81	1.88	1.94	2.00	2.06	2.13	2.19	2.25	2.31	2.38	2.44	2.50	2.63	2.75	2.88	3.00
4.....	2.08	2.17	2.25	2.33	2.42	2.50	2.58	2.67	2.75	2.83	2.92	3.00	3.08	3.17	3.25	3.33	3.50	3.67	3.83	4.00
5.....	2.60	2.71	2.81	2.92	3.02	3.13	3.23	3.33	3.44	3.54	3.65	3.75	3.85	3.96	4.06	4.17	4.38	4.58	4.79	5.00
6.....	3.13	3.25	3.38	3.50	3.63	3.75	3.88	4.00	4.13	4.25	4.38	4.50	4.63	4.75	4.88	5.00	5.25	5.50	5.75	6.00
7.....	3.65	3.79	3.94	4.08	4.23	4.38	4.52	4.67	4.81	4.96	5.10	5.25	5.40	5.54	5.69	5.83	6.13	6.42	6.71	7.00
8.....	4.17	4.33	4.50	4.67	4.83	5.00	5.17	5.33	5.50	5.67	5.83	6.00	6.15	6.33	6.50	6.67	7.00	7.33	7.66	8.00
9.....	4.69	4.88	5.06	5.25	5.44	5.63	5.81	6.00	6.19	6.38	6.56	6.75	6.94	7.13	7.31	7.50	7.88	8.25	8.62	9.00
10.....	5.21	5.42	5.63	5.83	6.04	6.25	6.46	6.67	6.88	7.08	7.29	7.50	7.71	7.92	8.13	8.33	8.75	9.17	9.58	10.00
11.....	5.73	5.96	6.19	6.42	6.65	6.88	7.11	7.33	7.56	7.79	8.02	8.25	8.48	8.71	8.94	9.17	9.63	10.08	10.54	11.00
12.....	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00	9.25	9.50	9.75	10.00	10.50	11.00	11.50	12.00

JOHNSTON'S

Patent Standard Dry-Sized

KALSOMINE AND FRESCO PAINTS,

FOR COLORING WALLS AND CEILINGS.

Gold Medal, New Orleans, 1884-5, and Eight First-Class Awards.

Nine-Tenths Cheaper than Wall Paper. Three-Fourths Cheaper than Oil Paint.

READY



FOR USE.

Pure White and Beautiful Tints.

Purifies and Beautifies.

Will not Rub and Scale from the Wall.

Invaluable in Cleansing and Disinfecting Walls Impregnated with Germs of Disease.

Mixed in 5 Minutes Ready for the Brush, by the addition of Water Only.

An Inexperienced Person can use it.

Five Pounds will Cover with a Good Body 500 Square Feet, on a Hard-Finished Wall.

ASK FOR

Johnston's Patent Dry-Sized

K A L S O M I N E,

*and see that you do not get any poor substitute. For sale by
Paint, Drug and Hardware Dealers everywhere.*

Send for Sample Card and Circular to

DRY KALSOMINE AND FRESCO PAINT WORKS,

Nos. 25 & 27 John St.,

BROOKLYN, N. Y.

Poisons and their Antidotes.

ARSENIC.—Use the stomach pump instantly; otherwise, give 20 grains sulphate of zinc in a little warm water to produce vomiting, or a large table spoonful of mustard in warm water. Meanwhile procure some *hydrated sesquioxide of iron* and give a tablespoonful of it with water every five or ten minutes until six doses are taken. *Dialyzed iron* is also efficient.

AQUA AMMONIA, or HARTSHORN, if taken undiluted is a violent poison. Give *Vinegar*, instantly, mixed with a little water, this acts by neutralization. Vegetable oils, in large quantity, furnish the next best antidote, the ammonia acting upon them to form Soap.

ACONITE.—Give an emetic of mustard or sulphate of zinc, or use the stomach pump, instantly, then give stimulants, whiskey, brandy, gin or rum, &c.

ACID—NITRIC, MURIATIC, or SULPHURIC.—If either of these be swallowed, not a moment is to be lost. The best remedy is to fill the patient full of *Calcedined Magnesia* stirred up in water, to the consistency of very thin paste; or, give half an ounce of soap shavings in a pint of water. If neither are at hand give chalk or whiting, in water, or even pound fine some of the white plastering from the wall and give in water.

BELLADONNA, HYOSCYAMUS, STAMONIUM, and CONIUM are all narcotics, and the treatment is the same as for opium; *especially the strong coffee.*

CANTHARIDES (Spanish Flies).—Give large doses of sweet oil, sugar and water, or milk. To relieve the strangury and scalding of urine whice it occasions, give camphor, 10 to 15 drop doses in water.

CORROSIVE SUBLIMATE, (Bed bug poison).—Mix up quickly the *whites of a dozen eggs*, with a quart of cold water, give a cupful of the mixture every two minutes till the stomach can hold no more. If you have not eggs enough use what you have and make up the deficiency with *milk*. Wheat flour, mixed with water, is good. Use the stomach pump if it can be had quickly.

CHARCOAL GAS, SULPHURETTED HYDROGEN, or CARBONIC ACID GAS.—Use cold shower bath and give Aconite in drop doses, in a spoonful of water. The effects of *Coal gas* are best antidoted by copious draughts of vinegar and water.

OXALIC ACID.—Give *Magnesia* in water as quickly as possible. When not to be had, use chalk, lime or saleratus. Use the stomach pump if at hand. Soap suds or alkalies are of no use with this Acid.

OPIUM, MORPHINE and LAUDANUM.—Use the stomach pump, if possible; if not, a powerful emetic, as sulphate of zinc; or, give the mustard emetic and tickle the palate. If drowsiness comes on, take the patient into the open air; dash water into the face, *by all means keep him walking*. If once allowed to fall asleep it may be impossible to arouse him. Strong coffee, taken hot, antidotes after the stomach has been emptied.

PRUSSIC ACID.—This is the deadliest of all known poisons. One drop of the *pure acid* will cause instantaneous death. If any of its products be taken and the result is not immediately fatal, resort to the cold shower bath, inhalation of diluted *aqua ammonia* vapor and give solution of carbonate of potass, 20 grains to a glass of water, or ammonia diluted with six times the bulk of water, freely.

SUGAR OF LEAD, (Acetate of Lead).—Give a ground mustard emetic; or, 20 grains sulphate of zinc in a glass of water; afterwards, large dose of epsom salts.

STRYCHNINE or NUX VOMICA, are rapid and deadly poisons, generally proving fatal, in spite of treatment. If emetics are given and the stomach emptied quickly enough, and if the patient is not attacked with convulsions within two hours, he will generally be safe. An abundance of sweet milk is recommended, also strong coffee, as for opium poisoning.

STRONG LYE.—Sometimes swallowed by children. The remedy is *vinegar, or oil*, the former by converting the lye into acetate of potash, the latter by forming soap; neither of which materially injures the stomach.

VERDIGRIS.—This most frequently poisons by its formation upon copper vessels used in cooking. Give an *emetic* instantly, and then two teaspoonfuls of *Carbonate of Soda*, in a tumbler full of water and repeat in ten minutes. Whites of eggs in water are also proper.



WM. H. RANSOM.

O. CHAN. WELLS.

RANSOM & WELLS, **WROUGHT AND CAST-IRON** **PIPE AND FITTINGS,**

For Steam, Water, Gas and Oil.

BRASS and IRON VALVES and COCKS,

RAILWAY, STEAMSHIP, MACHINISTS' ENGINEERS' AND FACTORY SUPPLIES,

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Gate Valves. The Marsh Patent Automatic Air
Valves. Excelsior Radiators.**

*If you wish to receive **BOTTOM PRICES** WHEN
WRITING TO ADVERTISERS for Cata-
logues, just mention having seen
the advertisement in*

HOPKINS' HANDY NOTES AND QUERIES.

HOPKINS' HANDY NOTES AND QUERIES.

WEIGHTS AND MEASURES.

Avoirdupois Weight.

The Grain is the same in Troy, Apothecaries and Avoirdupois Weights.

The standard avoirdupois pound is the weight of 27.7015 cubic inches of distilled water weighed in the air at 35.85 degrees Fahr., barometer at 30 inches.
27.343 grains = 1 drachm.

drachms.	ozs.	lbs.	qrs.	cwt.	ton.	French grammes.
1 =	.0625 =	.0039 =	.000133 =	.000035 =	.00000174 =	1.771846
16 =	1 =	.0625 =	.00223 =	.000553 =	.000028 =	28.34954
256 =	16 =	1 =	.0357 =	.00893 =	.000447 =	453.59
7168 =	448 =	28 =	1 =	.25 =	.0125 =	12700
28672 =	1792 =	112 =	4 =	1 =	.05 =	50802
573440 =	35840 =	2240 =	80 =	20 =	1 =	1016040

A stone = 14 pounds.

A quintal = 100 pounds

Troy Weight.

For Gold, Silver and Precious Metals.

grains.	dwts.	ozs.	lbs.	French grammes.
1 =	.04167 =	.00208 =	.0001736 =	.9643
24 =	1 =	.05 =	.004167 =	1.555
480 =	20 =	1 =	.0833 =	31.1035
5760 =	240 =	12 =	1 =	373.242

175 lbs. Troy = 144 Avoirdupois.

lbs. Avoirdupois X .82286 = lbs. Troy.

lbs. Troy X 1.2153 = lbs. Avoirdupois.

The jeweler's Carat is equal, in the United States, to 3.2 grains; in London, to 3.17 grains; in Paris, to 3.13.

Pure Gold is worth \$20.67 per oz. Troy, or \$19.34 per oz. Avoirdupois.

" Silver	"	\$1.36	"	\$1.24	"	"
Standard Gold	"	\$18.60	"	\$16.96	"	"
" Silver	"	\$1.225	"	\$1.117	"	"

Apothecaries' Weight.

United States and British.

20 grains.....	1 scruple.	
3 scruples.....	1 drachm = 60 grains.	
8 drams.....	1 ounce = 24 scruples = 480 grains.	
12 ounces.....	1 pound = 96 drachms = 288 scruples = 5760 grs.	

In Troy and Apothecaries' weights, the grain, ounce and pound are the same.

Long Measure.

ins.	feet.	yards.	fath.	poles.	furl.	mile.	French metres.
1 =	.083 =	.02778 =	.0139 =	.005 =	.000126 =	.0000158 =	.0254
12 =	1 =	.333 =	.1667 =	.0606 =	.00151 =	.0001894 =	.3048
36 =	3 =	1 =	.5 =	.182 =	.00454 =	.000563 =	.9144
72 =	6 =	2 =	1 =	.364 =	.0091 =	.001136 =	1.8287
198 =	16½ =	5½ =	2¾ =	1 =	.025 =	.003125 =	5.0291
7920 =	660 =	220 =	110 =	40 =	1 =	.125 =	201.16
63360 =	5280 =	1760 =	880 =	320 =	8 =	1 =	1609.315

A cable's length = 120 fathoms.

A square mile is 640 acres.

A league is three miles.

The term "Sabbath Day's Journey"

means 1,155 yards.

A day's journey is 33½ miles.

A fathom is six feet.

A hand (horse measure) is four inches.

A palm is three inches.

A span is 10¾ inches.

A cubit is two feet.

A great cubit is 11 feet.

A pace is three feet.

Surveying Measure (Linear).

ins.	links.	feet.	yards.	chains.	mile.	French metres.
1 =	.126 =	.0833 =	.0278 =	.00125 =	.0000158 =	.0254
7.92 =	1 =	.66 =	.22 =	.01 =	.000125 =	.2012
12 =	1.515 =	1 =	.333 =	.01515 =	.000189 =	.3048
36 =	4.545 =	3 =	1 =	.04505 =	.000568 =	.9144
792 =	100 =	66 =	22 =	1 =	.0125 =	20.116
63360 =	8000 =	5280 =	1760 =	80 =	1 =	1609.315

1 knot or geographical mile = 6082.66 feet = 1854 metres = 1.152 statute mile.

1 Admiralty knot = 1.1515 statute miles = 6080 feet.

Table of Quantities.

12 units or articles,	1 dozen.	20 quires	1 ream.
12 dozen	1 gross.	2 reams	1 bundle.
20 units or articles,	1 score.	5 bundles	1 bale.
24 sheets paper,	1 quire.	Printer's token,	250 sheets.

Wm. Rose & Bros.,

MANUFACTURERS OF

BRICKLAYERS' TOOLS:

Trowels, Hammers, Chisels and Steels.

PLASTERERS' TOOLS:

Trowels, Mitering Tools and Rules

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Round Knives, Head Knives, etc.

MOULDERS' TOOLS:

Trowels, Double-Enders, Lifters and Slickers.

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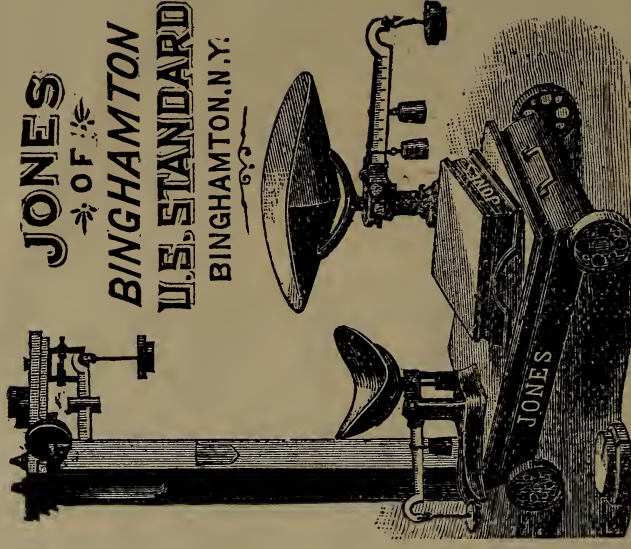
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"JONES, HE PAYS THE FREIGHT."

THE BEST AND THE CHEAPEST.

JONES
OF
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BINGHAMTON, N. Y.



We are devoting especial attention to the demands of the
HARDWARE TRADE, and we solicit your
application for prices.

JONES OF BINGHAMTON,
BINGHAMTON, N. Y.

HOPKINS' HANDY NOTES AND QUERIES.

WEIGHTS AND MEASURES—Continued.

Square Measure.

SQUARE MEASURES.											
ins.	feet.	yards.	perches.	roods.	acre.	Square metres.					
1	.00694	=	.000772	=	.0000255	=	.00000064	=	.000000159	=	.0000645
144	1	=	.111	=	.00367	=	.0000918	=	.000023	=	.0929
1296	9	=	1	=	.0331	=	.000826	=	.000262	=	.8361
39204	272 $\frac{1}{4}$	=	30 $\frac{1}{4}$	=	1	=	.025	=	.00625	=	25.292
1568160	10890	=	1210	=	40	=	1	=	.25	=	1011.7
6272640	43560	=	4840	=	160	=	4	=	1	=	4046.7

100 square feet = 1 square.
 1 chain wide = 8 acres per mile.
 10 square chains = 1 acre.
 1 hectare = 2.471143 acres.
 1 square mile. } = 27878400 sq. feet.
 = 3097600 sq. yds.
 = 640 acres.

Acres x .0015625 = square miles.
 Sq. yds. x .00000323 = sq. miles.

A section of land is 1 mile square, and contains 640 acres

A square acre is 208.71 feet at each side.

" " " 147.58 " "
 " " " 104.355 " "
 A circular " " 235.504 feet in diameter.
 " " " 166.527 " "
 " " " 117.752 " "

52 1-6	feet square,	or.....	2,722 $\frac{1}{2}$	square feet	is	1-16	acre.
73 $\frac{1}{2}$	feet square,	or.....	5,445	square	is	$\frac{1}{8}$	acre.
104 $\frac{1}{2}$	feet square,	or.....	10,890	square		$\frac{1}{4}$	acre.
120 $\frac{1}{2}$	feet square,	or.....	14,520	square		$\frac{3}{8}$	acre,
147 $\frac{1}{2}$	feet square,	or.....	21,780	square		1	acre.
208 $\frac{3}{4}$	feet square,	or.....	43,560	square feet			cre.

Cubic Measure.

ins.	feet.	yard.	cubic metres.
1	= .0005788	= .000002144	= .000016386.
1728	= 1	= .03704	= .028315
46656	= 27	= 1	= .764513

A cord of wood = 128 cubic feet, being 4 feet high, 4 feet wide, and 8 feet long.
 42 cubic feet = a ton of shipping.

A CUBIC FOOT IS EQUAL TO

1728 cubic inches.	29.92208 U. S. liquid quarts.
.037037 cubic yard.	25.71405 U. S. dry quarts.
.803564 U. S. struck bushel of 2150.42 cubic inches.	59.84416 U. S. liquid pints.
3.21426 U. S. pecks.	51.42809 U. S. dry pints.
7.48052 U. S. liquid galls. of 231 cub. inch.	239.37662 U. S. gills.
6.42851 U. S. dry gallons.	26667 flour barrel of 3 struck bushels.
	22748 U. S. liquid barrel of 31 $\frac{1}{2}$ gallons.

Dry Measure.

The Standard Bushel contains 2150.42 cubic inches, or 77.627013 pounds avoirdupois of pure water at maximum density. Its legal dimensions are 18 $\frac{1}{2}$ inches Diameter inside, 19 $\frac{1}{2}$ inches outside, and 8 inches deep; and when heaped, the cone must be 6 inches high, making a heaped bushel equal to 1 $\frac{1}{4}$ struck ones.

Pints.	Quarts.	Gallons.	Pecks.	Bushels.	Cubic Inches.			
2	=	1	=	.250	=	.0315	=	67.2
8	=	4	=	1	=	.5	=	268.8
16	=	8	=	2	=	1	=	537.6
64	=	32	=	8	=	4	=	2150.42

Liquid Measure.

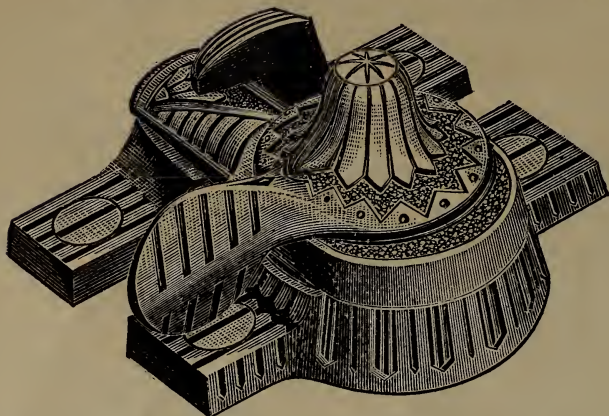
The standard gallon measures 231 cubic inches, or 8.33888 lbs., avoirdupois of pure water, at about 39.85 degrees Fahr., the barometer at 30 inches.

gills.		1 pint.		1 quart.		1 gallon.		1 tierce.		1 puncheon.		1 pipe.		1 tun.
4	=	1	=	2	=	4	=	1	=	2	=	4	=	1
32	=	8	=	1	=	4	=	1	=	2	=	4	=	1
1344	=	336	=	168	=	84	=	42	=	21	=	10.5	=	5.25
2016	=	504	=	252	=	126	=	63	=	31.5	=	15.75	=	7.875
2482	=	620	=	310	=	155	=	77.5	=	38.75	=	19.375	=	9.6875
4032	=	1008	=	504	=	252	=	126	=	63	=	31.5	=	15.75
8064	=	2016	=	1008	=	504	=	252	=	126	=	63	=	31.5

A cubic foot contains 7 $\frac{1}{2}$ gallons.

IVES' PATENT SASH LOCKS.

WARRANTED BURGLAR-PROOF.



A very important feature of the IVES SASH LOCK is in its securely locking when closed, and simultaneously drawing the meeting rails closely together. All the movements are accomplished by cams without the instrumentality of springs, thus avoiding the possibility of getting out of order.

IVES' PATENT SASH LOCKS and OR BOLTS are for sale by all DEALERS IN HARDWARE.

*Patented April 17, 1883; Oct. 16, '83; Dec. 30, '84;
March 24, '85; May 12, '85; June 23, '85;
Patented in Canada March 24, 1886.*

HOBART B. IVES & CO.,

SOLE MANUFACTURERS AND PATENTEES,

Send for Illustrated Price-Lists. - - NEW HAVEN, CONN.

"SUCCESS"



Sweat Collars

POSITIVELY PREVENT COLLAR GALLS AND SORE SHOULDERS.

OVER 2,000,000 HAVE BEEN SOLD IN THE PAST FOUR YEARS.

It requires no tying or sewing to the Collar.

It is always ready for use, and can be used on any collar.

It is one of the biggest paying articles in the country to handle.

For sale by the jobbing trade in general.

For information and catalogue, address

E. L. McCLAIN MANUFACTURING CO., Cincinnati, Ohio.

Please Mention this Book.

HOPKINS' HANDY NOTES AND QUERIES.

THE METRIC SYSTEM.

WEIGHTS.

Metric Denominations and values.		Equivalents in Denominations in use.	
Names.	No. Grams.	Weight of what quantity of water at maximum density.	Avoirdupois Weight.
Millier or tonneau	= 1,000,000	= 1 cubic meter	= 2204.6 pounds
Quintal	= 100,000	= 1 hectoliter	= 220.46 pounds
Myriagram	= 10,000	= 10 liters	= 22.046 pounds
Kilogram or kilo	= 1,000	= 1 liter	= 2.2046 pounds
Hectogram	= 100	= 1 deciliter	= 3.5274 ounces.
Dekagram	= 10	= 10 c. centimeter	= 0.3527 ounce.
Gram	= 1	= 1 c. centimeter	= 15.432 grains.
Decigram	= .1	= .1 c. centimeter	= 1.5432 grains.
Centigram	= .01	= 10 c. millimeter	= 0.1543 grain.
Milligram	= .001	= 1 c. millimeter	= 0.0154 grain.

MEASURES OF LENGTH.

Metric Denominations and Values.		Equivalents in Denominations in use.	
Myriameter	= 10,000 meters	= 6.2137 miles.	
Kilometer	= 1,000 meters	= 0.62137 m. or 3,280 feet	10 inches.
Hectometer	= 100 meters	= 328 feet and 1 inch.	
Dekameter	= 10 meters	= 39.37 inches.	
Meter	= 1 meter	= 39.37 inches.	
Decimeter	= .1 of a meter	= 3.937 inches.	
Centimeter	= .01 of a meter	= 0.3937 inch.	
Millimeter	= .001 of a meter	= 0.0394 inch.	

MEASURES OF SURFACE.

Metric Denominations and Values.		Equivalents in Denomination in use.	
Hectare	= 10,000 square meters	= 2.471 acres.	
Are	= 100 square meters	= 119.6 square yards.	
Centare	= 1 square meter	= 1.550 square inches.	

MEASURES OF CAPACITY.

Metric Denominations and Values.			Equivalents in Denominations in use.		
Names.	No. Liters.	Cubic Measure.	Dry Measure.	Wine Measure.	
Kiloliter	= 1,000	= 1 cubic meter	= 1.303 cubic yards	= 264.17 gallons.	
Hectoliter	= 100	= .1 cubic meter	= 2 bush. 3.35 pks.	= 26.417 gallons.	
Decaliter	= 10	= 10 c. decimeters	= 9.08 quarts	= 2.6417 gallons.	
Liter	= 1	= 1 c. decimeter	= 0.908 quart	= 1.0567 quarts	
Deciliter	= .1	= .1 c. decimeter	= 6.1022 cubic inch.	= 0.845 gill.	
Centiliter	= .01	= 10 c. centimeters	= 0.6102 cubic inch.	= 0.338 fluid oz.	
Milliliter	= .001	= 1 c. centimeter	= 0.061 cubic inches	= 0.27 fluid dr.	

SEYMOUR'S SHEARS

The Best Made. Every Pair Warranted,



Maroon and Black Japanned Handles, or

Nickel-Plated Handles and Blades.

**Straight and Bent Trimmers, Tailors'
Shears, Bankers' Shears, Ladies'
Scissors, Snips, &c.**

SOLD BY ALL RELIABLE DEALERS.

**Henry Seymour Cutlery Company,
84 AND 86 CHAMBERS ST., N. Y.**

**CUT NAILS,
SPIKES**

**CLINCH NAILS,
Boiler and Bridge Rivets,**

**BOILER BRACE JAWS,
STAY BOLT IRON,
SQUARE AND HEXAGON NUTS,
Washers and Bolts.**

**FULLER BROTHERS & CO.,
139 GREENWICH ST., - NEW YORK.**

HOPKINS' HANDY NOTES AND QUERIES.

Schedule of Extras on Cut Nails.

10d to 60d Common.....	at Standard or Lowest Price					
8d and 9d "	.25 per keg above 10d					
6d and 7d "	.50 " " "					
4d and 5d "	.75 " " "					
3d "	1.50 " " "					
3d Fine, 2d and Roofing	2.25 " " "					
2d Fine.....	4.00 " " "					
Cut Spikes, all sizes.....	.25 " " "					
Fencing and Sheathing.....	Same price as same size Common Nails.					
Coopers', Slating } and Tobacco.. }	3d	4d&5d	6d	8d	10d and larger.	
Casing, Flooring } and Box:..... }	2.00	1.25	1.00	.75	.50	per keg above 10d common.
Finishing.....	1.50	1.25	1.00	.75	"	" " "
Trunk.....	1.75	1.50	1.25	1.00	"	" " "
Clutch.....	2 & 2½ in. 2½ & 2¾ 3 in. & longer.					
" in half kegs..	2.00	1.75	1.50	per keg above 10d common		
" "	2.50	2.25	2.00	per 100 lbs. " " "		

Number of Nails and Tacks in a Pound.

NAILS.			TACKS.		
Title.	Length.	No. in a lb.	Title.	Length.	No. per lb.
3 penny fine	1½ inch	760 nails	1 ounce	3-16 inch	16,000
4 " common	1¾ "	480 "	1½ "	7-32 "	10,666
5 " "	1½ "	300 "	2 "	¼ "	8,000
6 " "	1¾ "	200 "	2½ "	5-16 "	6,400
7 " "	2 "	160 "	3 "	¾ "	5,332
8 " "	2¼ "	128 "	4 "	7-16 "	4,000
9 " "	2½ "	93 "	6 "	8-16 "	2,666
10 " "	2¾ "	72 "	8 "	9-16 "	2,000
12 " "	3 "	60 "	10 "	10-16 "	1,600
16 " "	¾ "	44 "	12 "	11-16 "	1,332
20 " "	3½ "	32 "	14 "	12-16 "	1,143
30 " "	4 "	24 "	16 "	13-16 "	1,000
40 " "	4½ "	18 "	18 "	14-16 "	888
50 " "	5 "	14 "	20 "	15-16 "	800
60 " "	5½ "	12 "	22 "	1 "	727
6 " fence	6 "	10 "	24 "	1½ "	666
8 " "	2 "	80 "			
10 " "	2½ "	50 "			
12 " "	3 "	34 "			
	3½ "	29 "			

No. of Cut Spikes in Keg of 100 Pounds.

3 inch.....	2,900	5 inch.....	950	6½ inches.....	575
3½ "	2,100	5½ "	850	7 "	450
4 "	1,500	6 "	775	8 "	375
4½ "	1,150				

AWARDED A DIPLOMA BY THE AMERICAN
INSTITUTE, NEW YORK.

AWARDED A BRONZE MEDAL BY THE
SYDNEY EXPOSITION, AUSTRALIA.

IT SAVES MONEY, TIME, LABOR AND NAILS.

THE GIANT NAIL-PULLER AND BOX-OPENER.



**NO MERCHANT, CARPENTER, PLUMBER, OR FARMER
CAN AFFORD TO BE WITHOUT ONE.**

IT PAYS FOR ITSELF.

ASK ANY ONE OF THE THOUSANDS WHO USE THEM.

MANUFACTURED BY

FOR SALE BY

MALTBY, MENLEY & CO., | ALL HARDWARE DEALERS

HOPKINS' HANDY NOTES AND QUERIES.

July 8, 1886.

STEEL WIRE NAILS.

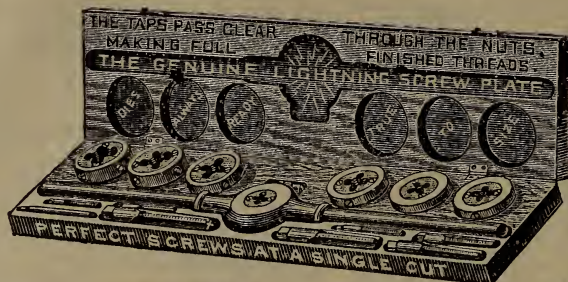
Standard Price List.

Size.	Length of Nail.	Add to the price of 10d Com. Standard.	Size.	Length of Nail.	Add to the price of 10d Com. Standard.
Common, Fence, Flooring Brads, Shingle and Tobacco Nails.			Barrel Nails.		
10d-60d.....	3 in. to 6 in..	Rate .....	.....	$\frac{3}{4}$ inch.....	\$5 00
8d & 9d.....	$2\frac{1}{2}$ in. & $2\frac{3}{4}$ in.	\$ 35	.....	$\frac{7}{8}$ inch.....	4 50
6d & 7d.....	2 in. & $2\frac{1}{4}$ in.	75	.....	1 inch.....	3 75
4d & 5d.....	$1\frac{1}{2}$ in. & $1\frac{3}{4}$ in.	1 10	.....	$1\frac{1}{8}$ inch.....	2 60
3d.....	$1\frac{1}{4}$ inch.....	2 25	.....	$1\frac{1}{2}$ inch.....	2 25
2d.....	1 inch.....	3 75	.....	$1\frac{3}{8}$ inch.....	1 50
Barbed Common.			.....	$1\frac{1}{2}$ inch.....	1 10
10d-60d.....	3 in. to 6 in ..	40	Slating Nails.		
8d & 9d.....	$2\frac{1}{2}$ in. & $2\frac{3}{4}$ in.	75	2d.....	1 inch.....	3 00
6d & 7d.....	2 in. & $2\frac{1}{4}$ in.	1 00	3d.....	$1\frac{1}{4}$ inch.....	2 00
4d & 5d.....	$1\frac{1}{2}$ in. & $1\frac{3}{4}$ in.	1 50	4d.....	$1\frac{1}{2}$ inch.....	1 50
3d.....	$1\frac{1}{4}$ inch.....	2 50	5d.....	$1\frac{3}{4}$ inch.....	1 25
2d.....	1 inch.....	4 00	Barbed Roofing Nails.		
Casing and Smooth Box.			.....	$\frac{3}{4}$ inch.....	4 50
10d-40d.....	3 in. to 5 in....	75	.....	$\frac{7}{8}$ inch.....	3 50
8d & 9d.....	$2\frac{1}{2}$ in. & $2\frac{3}{4}$ in.	1 25	2d.....	1 inch.....	3 00
6d & 7d.....	2 in. & $2\frac{1}{4}$ in.	1 50	3d.....	$1\frac{1}{4}$ inch.....	2 25
4d & 5d.....	$1\frac{1}{2}$ in. & $1\frac{3}{4}$ in.	2 00	4d.....	$1\frac{1}{2}$ inch.....	1 75
3d.....	$1\frac{1}{4}$ inch.....	3 00	5d.....	$1\frac{3}{4}$ inch.....	1 50
2d.....	1 inch.....	4 00	6d.....	2 inch.....	1 25
Barbed Box, 25c. add to Smooth.			Barbed Oval-Head Car Nails,		
Smooth Finishing Nails.			Light and Heavy.		
2d.....	1 inch.....	5 00	4d.....	$1\frac{1}{2}$ inch.....	1 75
3d.....	$1\frac{1}{4}$ inch.....	4 00	5d.....	$1\frac{3}{4}$ inch.....	1 50
4d & 5d.....	$1\frac{1}{2}$ in. & $1\frac{3}{4}$ in.	2 75	6d & 7d.....	2 in. & $2\frac{1}{4}$ in.	1 25
6d & 7d.....	2 in. & $2\frac{1}{4}$ in.	2 00	8d & 9d.....	$2\frac{1}{2}$ in. & $2\frac{3}{4}$ in.	1 00
8d & 9d.....	$2\frac{1}{2}$ in. & $2\frac{3}{4}$ in.	1 50	10d-60d.....	3 in. to 6 in....	75
10d-20d.....	3 in. to 4 in....	1 25	Clinch Nails.		
For Barbed, 25c. add to Smooth.			2d.....	1 inch.....	3 50
Fine Nails.			3d.....	$1\frac{1}{4}$ inch.....	2 75
2d.....	1 inch.....	4 50	4d & 5d.....	$1\frac{1}{2}$ in. & $1\frac{3}{4}$ in.	2 00
3d.....	$1\frac{1}{8}$ inch.....	3 75	6d-20d.....	2 in. to 4 in....	1 75
4d.....	$1\frac{1}{2}$ inch.....	2 75	Wire Spikes.		
Lining Nails.			All sizes.	3 in. to 9 in..	35
.....	$\frac{3}{4}$ inch.	6 00			
.....	$\frac{7}{8}$ inch.....	5 00			
.....	1 inch.....	4 50			

WILEY & RUSSELL MFG. CO.,

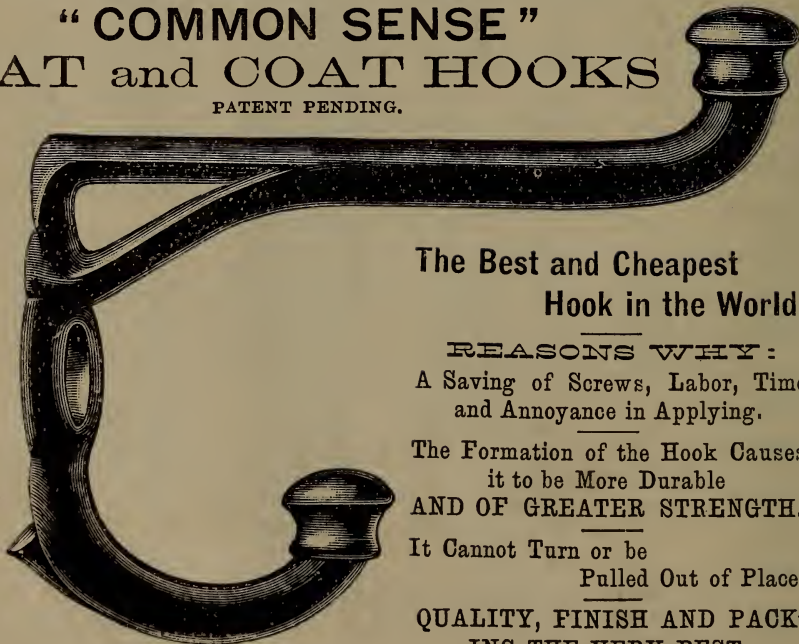
GREENFIELD, MASS.

PATENT SCREW-CUTTING AND OTHER LABOR-SAVING TOOLS.



SEND FOR COMPLETE LIST.

CHERRITON'S "COMMON SENSE" HAT and COAT HOOKS PATENT PENDING.



The Best and Cheapest
Hook in the World.

REASONS WHY:

A Saving of Screws, Labor, Time
and Annoyance in Applying.

The Formation of the Hook Causes
it to be More Durable
AND OF GREATER STRENGTH.

It Cannot Turn or be
Pulled Out of Place.

QUALITY, FINISH AND PACK-
ING THE VERY BEST.

Full Size Cut, Nos. 66 and 166.

HOPKINS' HANDY NOTES AND QUERIES.

APPROXIMATE NUMBER OF WIRE NAILS PER POUND.

Gauge.	Diam. W. & M.	Approximate Size.	Inches.																								
				$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	7	8		
00	.331	$1\frac{1}{2}$ scant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	27	23	20	18	16	15	14	12	10	9	8	7	6	5
0	.307	$1\frac{1}{4}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	29	25	21	19	17	16	15	13	11	10	9	8	7	$5\frac{1}{2}$
1	.283	$\frac{3}{4}$ scant.	.....	.....	.....	.....	.....	.....	.....	.....	57	50	45	38	32	28	25	23	21	19	16	14	13	11	10	8	7
2	.263	$\frac{1}{2}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	65	58	52	44	37	32	29	26	24	22	19	16	14	13	11	9	8
3	.244	$\frac{1}{4}$ scant.	.....	.....	.....	.....	.....	.....	.....	.....	76	67	60	50	43	38	34	30	28	25	22	19	17	15	13	11	10
4	.225	$\frac{1}{8}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	90	80	72	60	51	45	40	36	33	30	26	23	20	18	15	13	11
5	.207	$\frac{1}{16}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	106	94	85	71	60	53	47	42	39	35	30	26	24	21	18	15	11
6	.192	$\frac{1}{32}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	123	111	99	82	71	62	55	50	45	41	35	31	28	25	21	18	15
7	.177	$\frac{1}{64}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	141	123	111	99	85	75	67	60	54	50	43	37	33	30	25	21	18
8	.162	$\frac{1}{128}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	159	141	123	115	98	86	76	69	62	57	49	43	39	35	29	25	21
9	.148	$\frac{1}{256}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	177	159	141	133	115	100	88	78	70	62	54	47	41	37	33	29	25
10	.135	$\frac{1}{512}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	197	172	159	141	123	115	100	88	78	70	62	54	47	41	37	33	29
11	.120	scant.	.....	.....	.....	.....	.....	.....	.....	.....	211	184	165	141	123	115	100	88	78	70	62	54	47	41	37	33	29
12	.105		.....	.....	.....	.....	.....	.....	.....	.....	229	207	184	165	141	123	115	100	88	78	70	62	54	47	41	37	33
13	.092		.....	.....	.....	.....	.....	.....	.....	.....	247	229	207	184	165	141	123	115	100	88	78	70	62	54	47	41	37
14	.080		.....	.....	.....	.....	.....	.....	.....	.....	275	252	229	207	184	165	141	123	115	100	88	78	70	62	54	47	41
15	.072		.....	.....	.....	.....	.....	.....	.....	.....	302	275	252	229	207	184	165	141	123	115	100	88	78	70	62	54	47
16	.063		.....	.....	.....	.....	.....	.....	.....	.....	329	302	275	252	229	207	184	165	141	123	115	100	88	78	70	62	54
17	.054		.....	.....	.....	.....	.....	.....	.....	.....	356	329	302	275	252	229	207	184	165	141	123	115	100	88	78	70	62
18	.047		.....	.....	.....	.....	.....	.....	.....	.....	383	356	329	302	275	252	229	207	184	165	141	123	115	100	88	78	70
19	.041		.....	.....	.....	.....	.....	.....	.....	.....	410	383	356	329	302	275	252	229	207	184	165	141	123	115	100	88	78
20	.035	$\frac{1}{32}$ full.	.....	.....	.....	.....	.....	.....	.....	.....	437	410	383	356	329	302	275	252	229	207	184	165	141	123	115	100	88
21			.....	.....	.....	.....	.....	.....	.....	.....	464	437	410	383	356	329	302	275	252	229	207	184	165	141	123	115	100
22			.....	.....	.....	.....	.....	.....	.....	.....	491	464	437	410	383	356	329	302	275	252	229	207	184	165	141	123	115

This Table is an *Average* only, and the figures given may be varied slightly either way, by changes in the dimensions of the heads or points.

HARTMAN STEEL CO. LD.

**OFFICE and WORKS,
BEAVER FALLS, - PA.**

Western Office and Warehouse,
72 WEST LAKE ST., Chicago, Ill.

MANUFACTURERS OF
**OPEN HEARTH AND BESSEMER
STEELS**

OF EVERY DESCRIPTION.

**MARKET WIRE, FENCE WIRE,
HAY BALE TIES.**

STEEL WIRE NAILS,

—AND—

CAST STEEL WIRE BRADS.

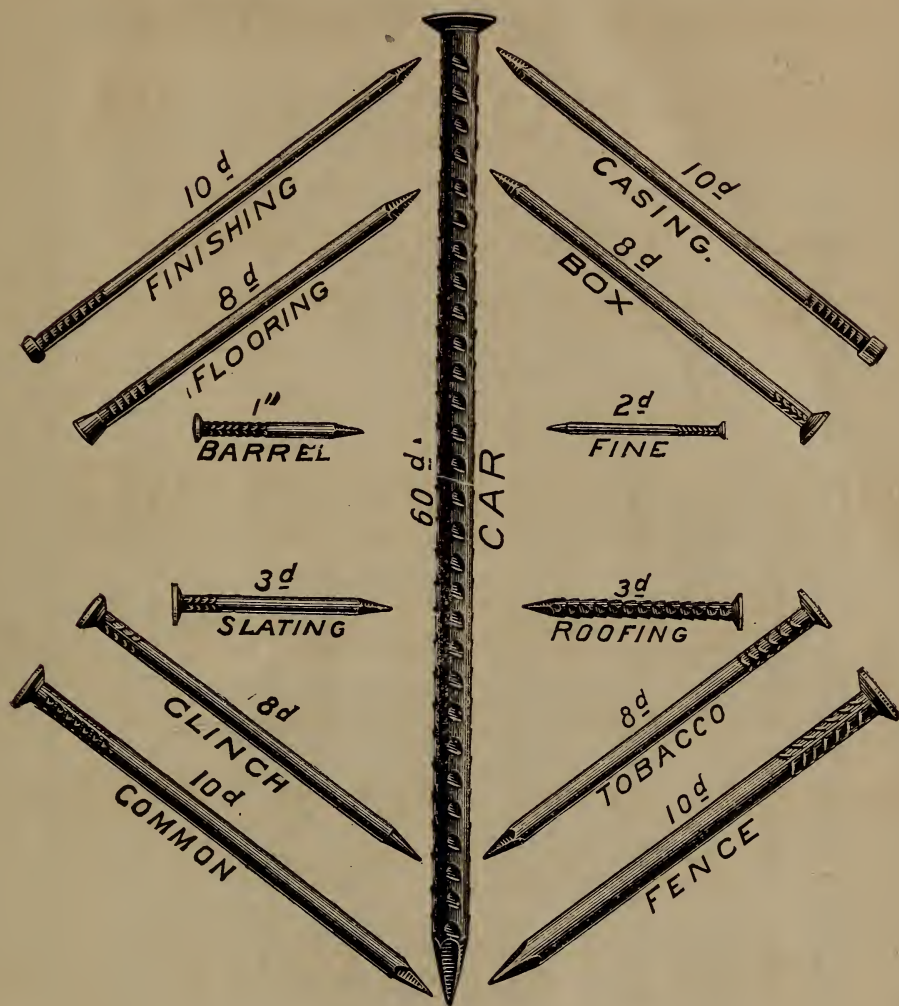
The Originators and Largest Manufacturers of

STANDARD WIRE NAILS,

to replace "Common Cut."

See opposite page, for Sample Card.

SAMPLE STYLES OF WIRE NAILS.



THE PUBLISHERS having made every effort to make this Book an acceptable gift to the Dealer to whom it is sent, would be pleased to receive in reply a Postal Card acknowledgment of its having safely arrived.

HOPKINS' HANDY NOTES AND QUERIES.

STANDARD STEEL WIRE NAILS.

SIZES, LENGTH AND NUMBER TO THE POUND.

SIZES.	Length.	Common.	Barbed Common.	Clinch.	Fence.	Finishing	Barbed Finishing	Fine.	Barrel.	Casing.	Smooth Box.	Barbed Box.	Flooring Brads.	Barbed Oval-Head Car Nail.		Slating.	Barbed Roofing.	Shingle.	Tobacco.	Lining.	Wire Spikes.	Length.	SIZES.
2d.....	3/4 in	1200	876	710	.....	.....	.....	.....	1500	.....	.....	.....	.....	Light.	Heavy.	.....	714	.....	.....	2100	.....	3/4 in	2d Fine
3d Fine	7/8 "	1200	876	710	.....	1558	1558	1550	1030	.....	1350	1143	.....	.....	.....	.....	469	.....	.....	1780	.....	7/8 "	3d Com.
3d Com	1 1/8 "	720	568	429	.....	980	913	1140	775	.....	913	885	.....	.....	.....	.....	411	.....	.....	1500	.....	1 1/8 "	4d
4d.....	1 1/4 "	432	357	274	.....	760	584	760	390	.....	.....	.....	.....	.....	.....	.....	251	.....	.....	.....	.....	1 1/4 "	5d
5d.....	1 3/8 "	300	235	235	142	575	410	.....	350	584	584	530	.....	274	165	209	165	.....	274	.....	.....	1 3/8 "	6d
6d.....	1 3/4 "	252	204	157	124	350	268	.....	.....	410	410	406	.....	142	118	142	142	270	235	.....	.....	1 3/4 "	7d
7d.....	2 "	186	139	139	92	275	238	.....	.....	310	310	299	157	124	103	.....	103	204	157	.....	.....	2 "	8d
8d.....	2 1/4 "	132	99	99	82	190	164	.....	.....	170	170	170	99	92	76	.....	.....	182	139	.....	.....	2 1/4 "	9d
9d.....	2 1/2 "	105	90	90	62	173	149	.....	.....	150	150	147	90	82	69	.....	.....	125	99	.....	.....	2 1/2 "	10d
10d.....	2 3/4 "	87	69	83	50	137	105	.....	.....	121	121	121	69	62	54	.....	.....	114	90	.....	50	2 3/4 "	11d
11d.....	3 "	66	53	64	38	98	97	.....	.....	97	97	94	53	47	38	.....	.....	83	69	.....	.....	3 "	12d
12d.....	3 1/4 "	51	43	59	30	81	71	.....	.....	72	72	72	43	43	35	.....	.....	.....	.....	.....	35	3 1/4 "	13d
13d.....	3 1/2 "	35	31	43	23	71	54	.....	.....	54	54	54	.....	31	26	.....	.....	.....	.....	26	26	3 1/2 "	14d
14d.....	4 "	27	24	.....	.....	.....	.....	.....	.....	46	46	44	.....	28	24	.....	.....	.....	.....	20	20	4 "	15d
15d.....	4 1/4 "	21	18	.....	.....	.....	.....	.....	.....	36	36	36	.....	21	18	.....	.....	.....	.....	15	15	4 1/4 "	16d
16d.....	5 "	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	14	.....	.....	.....	.....	12	12	5 "	17d
17d.....	5 1/4 "	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	13	.....	.....	.....	.....	10	10	5 1/4 "	18d
18d.....	6 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	9	6 "	19d
19d.....	6 1/4 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 1/4 "	20d
20d.....	6 1/2 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 1/2 "	21d
21d.....	7 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7 "	22d
22d.....	8 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8 "	23d
23d.....	9 "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9 "	24d

3 3/4 lbs. of 4d Common, or 2 3/4 lbs. of 3d Common, will lay 1000 shingles.
3 3/4 lbs. of 3d Fine will put on 1000 laths, 4 nails to the lath.

HOPKINS' HANDY NOTES AND QUERIES.

DIFFERENT STANDARDS FOR WIRE GAUGE IN USE IN THE UNITED STATES.

Dimensions of Sizes, in Decimal Parts of an Inch.

Number of Wire Gauge.	American, or Brown & Sharpe.	Birming- ham, or Stubbs's.	Washb'n & Moen Mfg. Co., Worces- ter, Mass.	Trenton Iron Co., Trenton, N. J.	G. W. Pren- tiss, Hol- yoke, Mass.	Old English from Brass Mfrs. List.	Number of Wire Gauge.
000000	.....	....	.46	....	....	....	000000
00000	.....	....	.43	.45	....	....	00000
0000	.46	.454	.393	.4	....	....	0000
000	.40964	.425	.362	.36	.3586	....	000
00	.3648	.38	.331	.33	.3282	....	00
0	.32495	.34	.307	.305	.2994	....	0
1	.2893	.3	.283	.285	.2777	....	1
2	.25763	.284	.263	.265	.2591	....	2
3	.22942	.259	.244	.245	.2401	....	3
4	.20431	.238	.225	.225	.223	....	4
5	.18194	.22	.207	.205	.2047	....	5
6	.16202	.203	.192	.19	.1885	....	6
7	.14428	.18	.177	.175	.1758	....	7
8	.12849	.165	.162	.16	.1605	....	8
9	.11443	.148	.148	.145	.1471	....	9
10	.10189	.134	.135	.13	.1351	....	10
11	.090742	.12	.12	.1175	.1205	....	11
12	.080808	.109	.105	.105	.1065	....	12
13	.071961	.095	.092	.0925	.0928	....	13
14	.064084	.083	.08	.08	.0816	.083	14
15	.057068	.072	.072	.07	.0726	.072	15
16	.05082	.065	.063	.061	.0627	.065	16
17	.045257	.058	.054	.0525	.0546	.058	17
18	.040303	.049	.047	.045	.0478	.049	18
19	.03589	.042	.041	.04	.0411	.04	19
20	.031961	.035	.035	.035	.0351	.035	20
21	.028462	.032	.032	.031	.0321	.0315	21
22	.025347	.028	.028	.028	.029	.0295	22
23	.022571	.025	.025	.025	.0261	.027	23
24	.0201	.022	.023	.0225	.0231	.025	24
25	.0179	.02	.02	.02	.0212	.023	25
26	.01594	.018	.018	.018	.0194	.0205	26
27	.014195	.016	.017	.017	.0182	.01875	27
28	.012641	.014	.016	.016	.017	.0165	28
29	.011257	.013	.015	.015	.0163	.0155	29
30	.010025	.012	.014	.014	.0156	.01375	30
31	.008928	.01	.0135	.013	.0146	.01225	31
32	.00795	.009	.013	.012	.0136	.01125	32
33	.00708	.008	.011	.011	.013	.01025	33
34	.006304	.007	.01	.01	.0118	.0095	34
35	.005614	.005	.0095	.0095	.0109	.009	35
36	.005	.004	.009	.009	.01	.0075	36
37	.004453	....	.0085	.0085	.0095	.0065	37
38	.003965	....	.008	.008	.009	.00575	38
39	.003531	....	.0075	.0075	.0083	.005	39
40	.003144	....	.007	.007	.0078	.0045	40

MONTGOMERY & CO.

IMPORTERS OF

Stubs' Files, Tools and Steel,

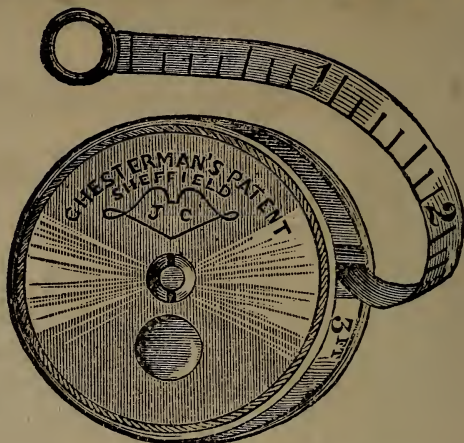
GROBET SWISS FILES,

Chesterman's Measures,

HUBERT'S FRENCH EMERY PAPER,
HORSE SHOE MAGNETS, ETC.

W. SMITH & SON'S
Celebrated Music Wire.

French Sheet Steel $3\frac{1}{4}$ in. Wide
from 4 to 65 Thousandths.



Machinists', Silversmiths', Jewelers', Die Sinkers' and Sewing
Machine Manufacturers'

❖❖SUPPLIES.❖❖

105 FULTON STREET, NEW YORK.

GEO. W. MONTGOMERY;

GEO. W. CHURCH.

E. J. MITCHELL & CO.,

MANUFACTURERS OF

LEATHER PUMP PACKINGS,



AND ALL KINDS OF LEATHER, RUBBER, AND FIBRE

WASHERS,

FOR PLUMBING AND MECHANICAL USE.

633 and 635 Van Buren St., - Brooklyn, N. Y.

HOPKINS' HANDY NOTES AND QUERIES.

FROM BROWN & SHARPE. TABLE OF DECIMAL EQUIVALENTS, of 8ths, 16ths, 32nds and 64ths of an Inch.

FOR USE IN CONNECTION WITH
MICROMETER CALIPER.

8ths.	32nds.	64ths.	64ths.
$\frac{1}{8}$ = .125	$\frac{1}{32}$ = .03125	$\frac{1}{64}$ = .015625	$\frac{33}{64}$ = .515625
$\frac{1}{4}$ = .250	$\frac{3}{32}$ = .09375	$\frac{3}{64}$ = .046875	$\frac{35}{64}$ = .546875
$\frac{3}{8}$ = .375	$\frac{5}{32}$ = .15625	$\frac{5}{64}$ = .078125	$\frac{37}{64}$ = .578125
$\frac{1}{2}$ = .500	$\frac{7}{32}$ = .21875	$\frac{7}{64}$ = .109375	$\frac{39}{64}$ = .609375
$\frac{5}{8}$ = .625	$\frac{9}{32}$ = .28125	$\frac{9}{64}$ = .140625	$\frac{41}{64}$ = .640625
$\frac{3}{4}$ = .750	$\frac{11}{32}$ = .34375	$\frac{11}{64}$ = .171875	$\frac{43}{64}$ = .671875
$\frac{7}{8}$ = .875	$\frac{13}{32}$ = .40625	$\frac{13}{64}$ = .203125	$\frac{45}{64}$ = .703125
16ths.	$\frac{15}{32}$ = .46875	$\frac{15}{64}$ = .234375	$\frac{47}{64}$ = .734375
$\frac{1}{16}$ = .0625	$\frac{17}{32}$ = .53125	$\frac{17}{64}$ = .265625	$\frac{49}{64}$ = .765625
$\frac{3}{16}$ = .1875	$\frac{19}{32}$ = .59375	$\frac{19}{64}$ = .296875	$\frac{51}{64}$ = .796875
$\frac{5}{16}$ = .3125	$\frac{21}{32}$ = .65625	$\frac{21}{64}$ = .328125	$\frac{53}{64}$ = .828125
$\frac{7}{16}$ = .4375	$\frac{23}{32}$ = .71875	$\frac{23}{64}$ = .359375	$\frac{55}{64}$ = .859375
$\frac{9}{16}$ = .5625	$\frac{25}{32}$ = .78125	$\frac{25}{64}$ = .390625	$\frac{57}{64}$ = .890625
$\frac{11}{16}$ = .6875	$\frac{27}{32}$ = .84375	$\frac{27}{64}$ = .421875	$\frac{59}{64}$ = .921875
$\frac{13}{16}$ = .8125	$\frac{29}{32}$ = .90625	$\frac{29}{64}$ = .453125	$\frac{61}{64}$ = .953125
$\frac{15}{16}$ = .9375	$\frac{31}{32}$ = .96875	$\frac{31}{64}$ = .484375	$\frac{63}{64}$ = .984375

TABLE OF DECIMAL EQUIVALENTS OF MILLIMETERS AND FRACTIONS OF MILLIMETERS, FOR USE IN CONNECTION WITH METRIC MICROMETER CALIPER.

mm. Inches.	mm. Inches.	mm. Inches.	mm. Inches.
$\frac{1}{50}$ = .00079	$\frac{20}{50}$ = .01575	$\frac{39}{50}$ = .03071	9 = .35433
$\frac{2}{50}$ = .00157	$\frac{21}{50}$ = .01654	$\frac{40}{50}$ = .03150	10 = .39370
$\frac{3}{50}$ = .00236	$\frac{22}{50}$ = .01732	$\frac{41}{50}$ = .03228	11 = .43307
$\frac{4}{50}$ = .00315	$\frac{23}{50}$ = .01811	$\frac{42}{50}$ = .03307	12 = .47244
$\frac{5}{50}$ = .00394	$\frac{24}{50}$ = .01890	$\frac{43}{50}$ = .03386	13 = .51181
$\frac{6}{50}$ = .00472	$\frac{25}{50}$ = .01969	$\frac{44}{50}$ = .03465	14 = .55118
$\frac{7}{50}$ = .00551	$\frac{26}{50}$ = .02047	$\frac{45}{50}$ = .03543	15 = .59055
$\frac{8}{50}$ = .00630	$\frac{27}{50}$ = .02126	$\frac{46}{50}$ = .03622	16 = .62992
$\frac{9}{50}$ = .00709	$\frac{28}{50}$ = .02205	$\frac{47}{50}$ = .03701	17 = .66929
$\frac{10}{50}$ = .00787	$\frac{29}{50}$ = .02283	$\frac{48}{50}$ = .03780	18 = .70866
$\frac{11}{50}$ = .00866	$\frac{30}{50}$ = .02362	$\frac{49}{50}$ = .03858	19 = .74803
$\frac{12}{50}$ = .00945	$\frac{31}{50}$ = .02441	1 = .03937	20 = .78740
$\frac{13}{50}$ = .01024	$\frac{32}{50}$ = .02520	2 = .07874	21 = .82677
$\frac{14}{50}$ = .01102	$\frac{33}{50}$ = .02598	3 = .11811	22 = .86614
$\frac{15}{50}$ = .01181	$\frac{34}{50}$ = .02677	4 = .15748	23 = .90551
$\frac{16}{50}$ = .01260	$\frac{35}{50}$ = .02756	5 = .19685	24 = .94488
$\frac{17}{50}$ = .01339	$\frac{36}{50}$ = .02835	6 = .23622	25 = .98425
$\frac{18}{50}$ = .01417	$\frac{37}{50}$ = .02913	7 = .27559	26 = 1.02362
$\frac{19}{50}$ = .01496	$\frac{38}{50}$ = .02992	8 = .31496	

10 mm. = 1 Centimeter = 0.3937 inches.

10 cm. = 1 Decimeter = 3.937 "

10 dm. = 1 Meter = 39.37 "

25.4 mm. = 1 English Inch.

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Anti-Friction
STEEL
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Best Hanger Made.

Is Unsurpassed for STRENGTH,
EASE OF WORKING or SIM-
PLICITY of CONSTRUCTION.
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Ready Seller and full of Merit.

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dozen pairs, -	\$15 00
5-Inch Wheel, 10-foot run, per	
dozen pairs, -	18 00

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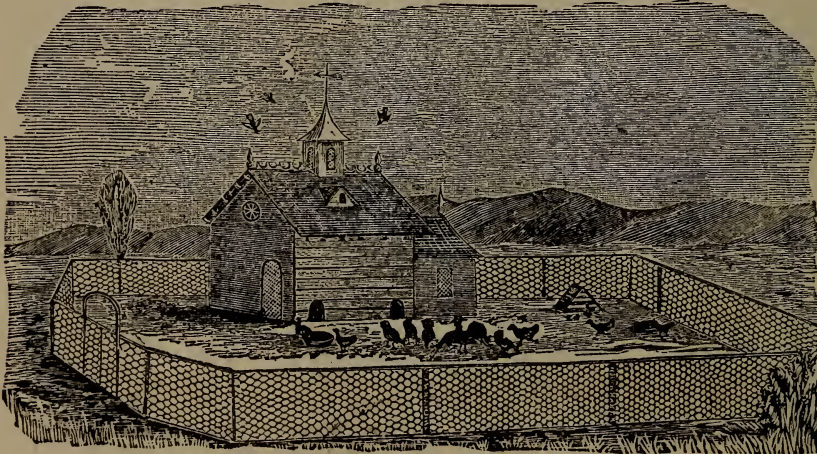
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INCORPORATED 1874.

Gilbert & Bennett Mfg. Co.



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nized Web Wire Fence, Galvanized Twist Wire Poultry Netting.

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HOPKINS' HANDY NOTES AND QUERIES.

Size, Weight, Length and Strength of Iron Wire.

BIRMINGHAM WIRE GAUGE.

Wire Gauge.	Diameter.	Weight of 100 Yards.	Weight of 1 mile.	Length of 1 Bundle.	Length of 1 Cwt.	DIRECT STRAIN.	
						Area of Section.	Breaking Weight.
No.	Inches.	Lbs.	Lbs.	Yards.	Yards.	Sq. in.	Lbs.
5-0	0 546	161 00	2830	39	70	0 163	13070
4-0	0 425	140 00	2460	45	80	0 142	11350
3-0	0 394	120 00	2113	52	93	0 122	9755
2-0	0 363	102 00	1794	62	110	0 103	8280
0	0 331	84 72	1490	74	132	0 086	6880
1	0 300	68 75	1210	91	162	0 071	5650
2	0 280	59 90	1054	105	187	0 062	4930
3	0 260	51 65	909	121	215	0 053	4250
4	0 240	44 00	775	143	255	0 045	3620
5	0 220	37 00	651	170	303	0 038	3040
6	0 200	30 56	538	203	361	0 031	2510
7	0 185	26 15	461	239	428	0 0265	2220
8	0 170	22 10	389	286	509	0 023	1840
9	0 155	18 36	323	342	609	0 0195	1560
10	0 140	14 97	264	420	747	0 016	1280
11	0 125	11 95	211	529	939	0 0125	1000
12	0 110	9 24	163	700	1244	0 010	800
13	0 095	7 05	124	893	1589	0 0071	568
14	0 085	5 51	97	1142	2031	0 0057	456
15	0 075	4 29	76	1468	2608	0 0044	352
16	0 065	3 22	57	1954	3473	0 0033	264
17	0 057	2 48	44	2540	4515	0 0026	208
18	0 050	1 91	34	3150	5600	0 0020	160
19	0 045	1 55	27	4085	7246	0 0016	128
20	0 040	1 22	21	4912	9168	0 0013	104
21	0 035	0 94	17	6416	11980	0 0010	80
22	0 030	0 69	12	8736	16300	0 0007	56

Sizes Expressed in Fractions of an Inch.

15-32 in.—No. 5-0 full	5-16 in.—No. 1 full.	1-8 in.—No. 11
7-16 in.—No. 4-0 full	9-32 in.—No. 2	1-10 in.—No. 13 full
13-32 in.—No. 3-0 full	1-4 in.—No. 3½	1-12 in.—No. 14
3-8 in.—No. 2-0 full	7-32 in.—No. 5	1-16 in.—No. 16
11-32 in.—No. 0 full	3-16 in.—No. 7	1-32 in.—No. 22
	5-32 in.—No. 9	

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MANUFACTURERS OF
BUILDERS' HARDWARE,

In Real Bronze, Brass and Bronzed Iron,

IN VARIOUS FINISHES KNOWN AS

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HOPKINS' HANDY NOTES AND QUERIES.

Use of Wire in Telegraph Service.

No. 4, much used on important lines where the multiplex systems are in use. In the United States in the past few seasons largely replacing smaller sizes.

About 3 per cent. of telegraph wire used in United States is No. 6.

No. 8, medium size for circuits not exceeding 400 miles. Most largely used in United States, now giving way to No. 4.

No. 9 represents about one-half the wire in U. S. Telegraph service.

No. 10, shorter circuits, railway telegraph and private lines in United States and Europe.

Nos. 11 and 12, short circuits, police and fire alarms, telephone, etc.

Nos. 14 to 16, short private lines and for telephone service, a low steel being the material.

Use of Large Wire.

Much of the new, and all of the most important line construction of the Western Union Telegraph Company, in the past two or three seasons has called for No. 4 Wire in place of No. 8 and No. 9, as a marked tendency in advanced telegraph service.

"The charge of electricity measured by its potential, resides only on the surface of line wire and its amount is determined by the magnitude and form of the surface. A No. 8 wire has a surface of 225.04 square feet to the mile; a No. 6 wire has 286.37 square feet."

From all the evidence of the best telegraph experts, the larger the wire the greater the strength of the signal that can be transmitted through it to any distance.

Grades of Telegraph Wire.

Iron wire manufactured exclusively for telegraphic service is known in the market in this country and abroad by terms common to the trade as follows:

Extra Best Best (E. B. B.) Made by improved continuous processes from the very best iron. It stands highest of any telegraph wire in conductivity, with a weight per mile ohm (*see below*), of from 4600 to 5100 lbs. Very uniform in quality, pure, tough and pliable.

2 Best Best (B. B.) Less uniform and tough than the above-named, but stands a good mechanical test. "Weight per mile ohm," 5500 to 5800 lbs. Is largely used by some telegraph companies and in railway telegraph service.

3 "Best" (B) A term almost indiscriminately applied to the lower grades of wire designed for electric service. A harder and less pliable wire, "weight per mile ohm," about 6500.

4 "Steel" (or Homogeneous metal) more expressly designed for short line Telephone service where a measure of conductivity can be exchanged for tensile strength in a light wire. "Weight per mile ohm," 6000 to 7000 lbs.

Weight per Mile Ohm.

This term is to be understood as distinguishing the *resistance of material* only, and means the weight of such material required per mile to give the resistance of one Ohm. To ascertain the mileage resistance of any wire, divide the "weight per mile ohm" by the weight of the wire per mile. Thus in a grade of Extra Best Best, of which the weight per mile ohm is given at the average of 4360, the mileage resistance of No. 4, (weight per mile 707 lbs) would be about 6 ohms, and No. 14 steel wire 6600 lbs, weight per mile ohm, (29 lbs weight per mil) would show about 75 ohms.

Measuring Weight of Live Cattle.

An allowance of 23 lbs. to the superficial foot is made for cattle that girt from 5 to 7 feet; from 7 to 9 feet, 31 lbs.; 16 lbs. for small cattle and calves that girt from 3 to 5 feet, and 11 lbs. to the superficial foot for pigs, sheep, and cattle that girt less than 3 feet. *Rule:* Multiply the girt in inches, back of the shoulder, by the length in inches from the square of the buttock to a point even with the point of the shoulder-blade, and divide by 144 to find the superficial feet: this result multiplied by the number of lbs., allowed as above for cattle of different girts, will give the weight sought.

"Novelty" Dust Pan

A Humane Invention.

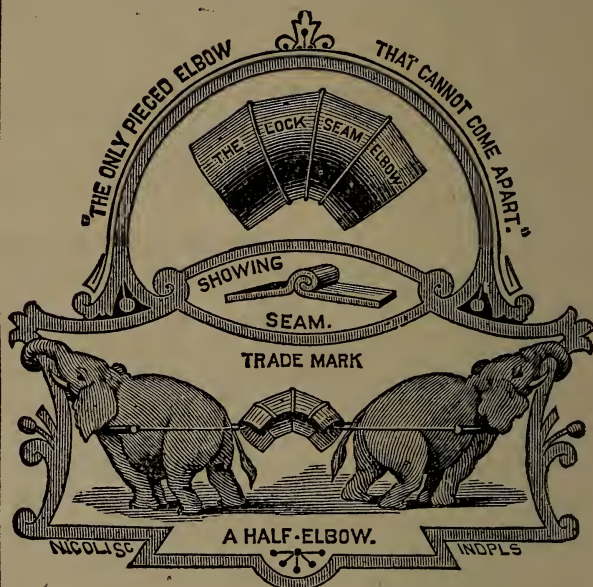


Also a Triple Edge.
Ain't this a "Daisy"?

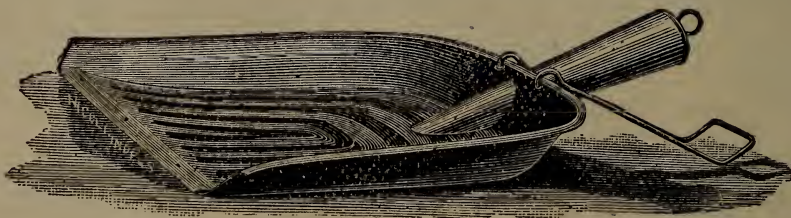
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Is the recognized **STANDARD ELBOW**
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HOPKINS' HANDY NOTES AND QUERIES.

Wires of Various Metals Compared.

The following table is given by Mr. David Kirkaldy, of London, to exhibit the tensile strength and resistance to tension of wire made of various materials.

Specimens Tested.	Pulling Stress per square inch	
	Hard. Pounds.	Annealed. Pounds.
Copper.....	63.122	37.002
Brass.....	81.156	51.550
Charcoal Iron.....	65.834	46.60
Coke Iron.....	65.321	61.294
Steel.....	120.976	74.637
Phosphor Bronze, No. 1.....	159.515	58.853
“ “ No. 2.....	151.119	64.569
“ “ No. 3.....	120.141	54.111
“ “ No. 4.....	120.900	53.371

Specimens Tested.	Extension per cent.		No. twists in 5 inches.
	Annealed.	Hard.	Annealed.
Copper.....	34.1	86.8	96
Brass.....	36.5	14.7	57
Charcoal Iron.....	28.	48.	87
Coke Iron.....	17.	26.	44
Steel.....	10.9	*	79
Phosphor Bronze, No. 1.....	46.6	13.3	66
“ “ No. 2.....	42.8	15.8	60
“ “ No. 3.....	44.9	17.3	53
“ “ No. 4.....	42.4	13.	124

Of the eight pieces of steel tested three stood from 40 to 45 twists, and five stood from 1½ to 4 twists.

Relative Malleability of the Metals.

- | | | | |
|------------|------------|--------------|----------|
| 1. Gold. | 3. Copper. | 5. Platinum. | 7. Zinc. |
| 2. Silver. | 4. Tin. | 6. Lead. | 8. Iron. |

Specific Resistances of Metals.

Copper.....	1.00	Mercury.....	50.00	Brass Wire.....	3.88
Silver.....	.98	Palladium.....	5.50	German Silver Wire.	11.30
Gold.....	1.13	Platinum.....	6.78	Nickel Wire.....	7.70
Iron.....	5.63	Tin Wire.....	6.80	Calcium Wire.....	2.61
Lead.....	10.76	Zinc Wire.....	3.70	Aluminium Wire....	1.75

List of Conductors and Non-Conductors,

In which each substance named conducts better than that which precedes it; the first being the best insulator, the last the best conductor

- | | | | |
|------------------|----------------|-----------------------|---------------|
| 1. Dry Air. | 8. Glass. | 15. Saline Solutions. | 20. Tin. |
| 2. Paraffine. | 9. Silk. | 16. Acids. | 21. Iron. |
| 3. Hard Rubber. | 10. Dry Paper. | 17. Charcoal or Coke. | 22. Platinum. |
| 4. Shellac. | 11. Porcelain. | 18. Mercury. | 23. Zinc. |
| 5. India Rubber. | 12. Dry Wood. | 19. Lead. | 24. Gold. |
| 6. Gutta Percha. | 13. Dry Ice. | | 25. Copper. |
| 7. Sulphur. | 14. Water. | | 26. Silver. |

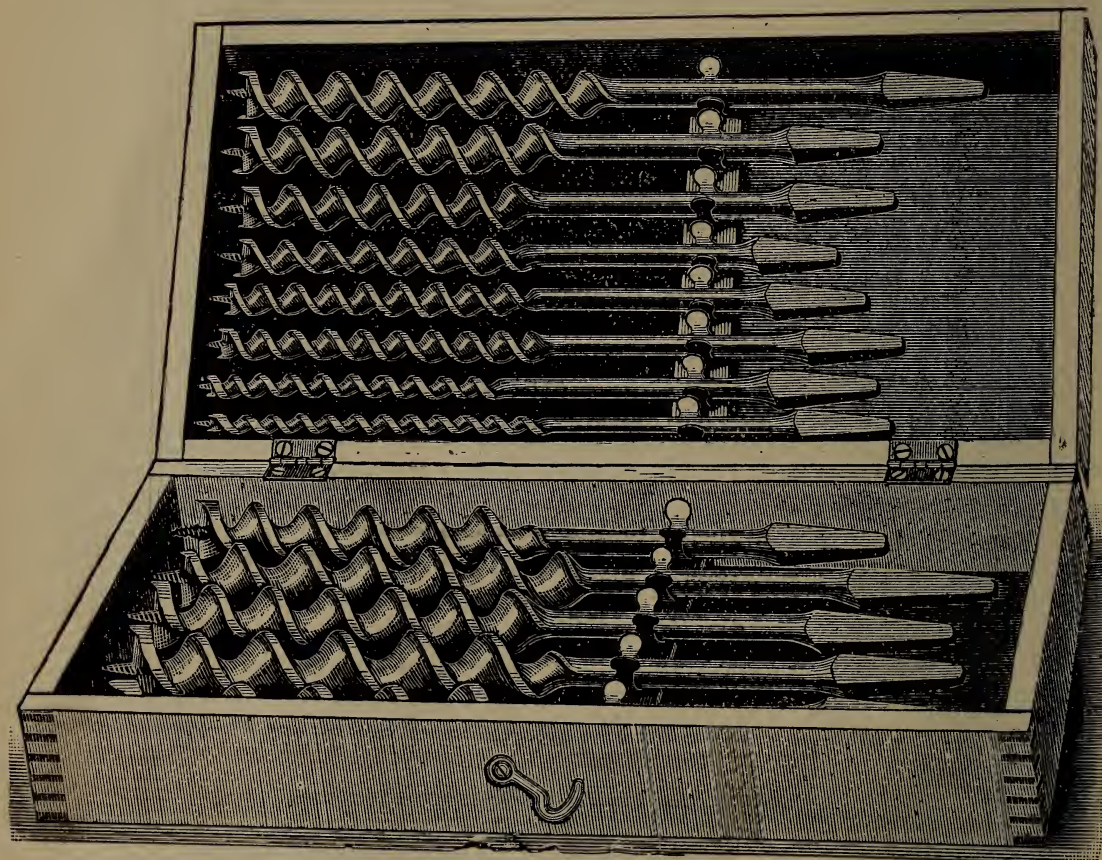
When a wire of small resistance and an insulator of great resistance are employed upon a line the highest excellence is secured, since the lower the resistance in the former the better is the transmission, and the higher the resistance in the latter the less the waste of the current.

C. E. JENNINGS & CO'S

EXTRA QUALITY AUGER BITS.

ALL OUR AUGER BITS ARE MADE OF SOLID CAST STEEL AND WARRANTED.

THIS Illustration represents our Auger Bits put up in Wood Boxes with a rack to hold one Auger Bit of each size. This is a great convenience to Mechanics, as the Bits can be put away immediately after use, each Bit fitting into its own place. These Boxes would cost the Mechanic at least 50 cents without the Bits.



No. 10 set Extension-Lip Pattern, 32½ Quarters, \$5.00 per set.

C. E. JENNINGS & CO.,

79 and 81 Reade and 97 Chambers Streets,
NEW YORK.

HOPKINS' HANDY NOTES AND QUERIES.

Table of Iron, Steel, Copper and Brass Wire.

WEIGHT OF 100 FEET IN POUNDS. BIRMINGHAM WIRE GAUGE.

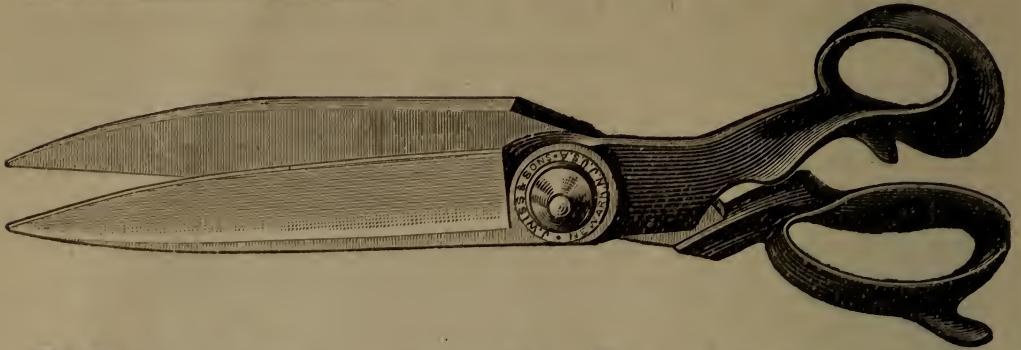
Brass and Copper Wire from 0 to 25 is numbered by Stubs' Gauge. Fine Wire from No. 26 is numbered by London Gauge.

No. of Gauge.	PER LINEAL FOOT.			
	Iron.	Steel.	Copper.	Brass.
0000	54 62	55 13	62 39	58 93
000	47 86	48 32	54 67	51 64
00	38 27	38 63	43 71	41 28
0	30 63	30 92	34 99	33 05
1	23 85	24 07	27 24	25 73
2	21 37	21 57	24 41	23 06
3	17 78	17 94	20 3	19 18
4	15 01	15 15	17 15	16 19
5	12 82	12 95	14 65	13 84
6	10 92	11 02	12 47	11 78
7	8 586	8 667	9 807	9 263
8	7 214	7 283	8 241	7 783
9	5 805	5 859	6 63	6 262
10	4 758	4 803	5 435	5 133
11	3 816	3 852	4 359	4 117
12	3 148	3 178	3 596	3 397
13	2 392	2 414	2 723	2 58
14	1 826	1 843	2 085	1 969
15	1 374	1 387	1 569	1 482
16	1 119	1 13	1 279	1 208
17	8915	9	1 018	9618
18	6363	6423	7168	6864
19	4675	472	534	5043
20	3246	3277	3709	3502
21	2714	274	31	2929
22	2079	2098	2373	2241
23	1656	1672	1892	1788
24	1283	1295	1465	1384
25	106	107	1211	1144
26	0859	0867	0981	0926
27	0678	0685	0775	0732
28	0519	0524	0593	056
29	0448	0452	0511	0483
30	0382	0385	0436	0412
31	0265	0267	0303	0286
32	0215	0217	0245	0231
33	017	0171	0194	0183
34	013	0131	0148	014
35	0066	0067	0076	0071
36	0042	0042	0048	0046

J. WISS & SONS,

Manufacturers of

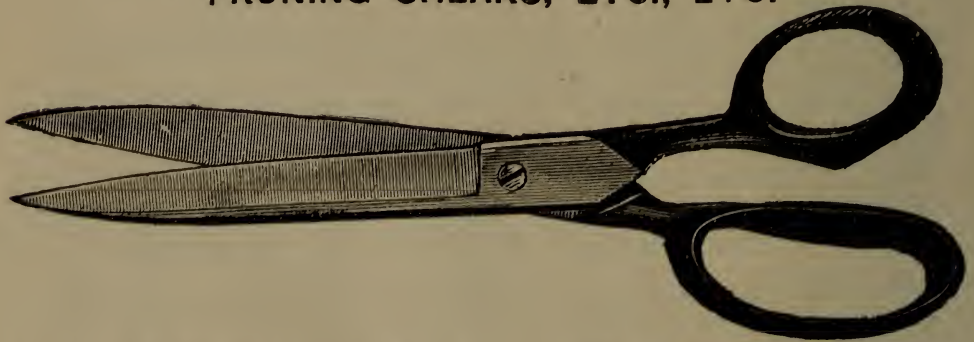
Only Best Quality Japanned and Nickle-Plated



Shears and Scissors.

Large Assortment and Full Line of

**TAILORS' SHEARS, STRAIGHT AND BENT TRIMMERS,
BANKER AND PAPER SHEARS, LADIES' SCISS-
ORS, BARBER SHEARS, TINNERS' SNIPS,
PRUNING SHEARS, ETC., ETC.**



All Goods Warranted to be of the Very BEST QUALITY and FINISH.

Sold by all the Principal Dealers in the United States.

**J. WISS & SONS,
NEWARK, - - - N. J.**

Send for Price Lists and Discounts.

HOPKINS' HANDY NOTES AND QUERIES.

TABLE OF WEIGHTS,

Showing Estimated Number of Pounds of Barbed Wire Required
to Fence Space or Distances Mentioned, with
One, Two or Three Strands.

	1 STRAND.	2 STRANDS.	3 STRANDS.
1 Square Acre.....	57.5 lbs.	115 lbs.	172 lbs.
1 Side of a Square Acre.	15½ "	28½ "	42½ "
1 Square Half-Acre....	40½ "	81 "	121½ "
1 Square Mile.....	1440 "	2880 "	4320 "
1 Side of 1 Square Mile.	360 "	720 "	1080 "
1 Rod in Length.....	1½ "	2½ "	3½ "
100 Rods in Length.....	112½ "	225 "	337½ "
100 Feet in Length.....	7 "	14 "	21 "

When Posts are placed apart. There are required for each strand of wire, for one mile of fence... Total cost of 1 mile of fence when posts cost 12½c. each, and wire and staples cost 7½c. lb. for galvanized.

FEET.	POSTS.	LEB. OF STAPLES	LEB. OF WIRE.	3 STRANDS.	4 STRANDS.
8	660	7½	360	\$167 90	\$196 35
10	528	5½	360	149 00	180 39
12	440	4¾	360	139 78	168 07
16½	320	3½	360	124 45	152 68
20	264	3	360	117 40	145 53
25	212	2½	360	110 74	138 80
30	176	2	360	106 16	134 22
33	160	1¾	360	104 09	132 15

Number of Wires and Distances Between Posts.

Although fences are sometimes made of *two* wires, to fence against cattle only, experts recommend no less than *three*, and as many more as desirable. *Five* wires make a good fence—such is used by nearly all the railroad companies.

The following are the distances apart at which the wires are generally placed:

Two-wire fence, 1st wire 22 inches, 2d wire 44 inches from the ground.

Three-wire fence, 1st wire 16 inches, 2d wire 30 inches, 3d wire 48 inches from the ground.

Four-wire fence, 1st wire 12 inches, 2d wire 24 inches, 3d wire 36 inches, 4th wire 48 inches from the ground.

Five-wire fence, 1st wire 8 inches, 2d wire 15 inches, 3d wire 24 inches, 4th wire 36 inches, 5th wire 48 inches from the ground.

One less strand may be used with *four-point* than *two-point* wire.

The HEIGHT OF THE LEGAL FENCE varies as follows:

Four feet high in Maine, New Hampshire, Massachusetts, Delaware and Idaho.

Four and a half feet high in Vermont, Rhode Island, Connecticut, New York, New Jersey, Maryland, West Virginia, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Tennessee, Kansas, Nebraska, Colorado, Oregon, Arizona, Nevada, Montana, Dakota and Utah.

Five feet in Pennsylvania, Virginia, Missouri, Kentucky, North Carolina, South Carolina, Georgia, Alabama, Florida, Mississippi, Texas, Arkansas, California, and Washington and Wyoming Territories.

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AND
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**BARKER, RATCHET,
EMPIRE, Ball and Toy
BIT BRACES.**

**WROUGHT-STEEL
Door Hangers.
RUST-PROOF**

**Butter Spades.
Rapid Transit and "S"
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Nos. 31 & 33

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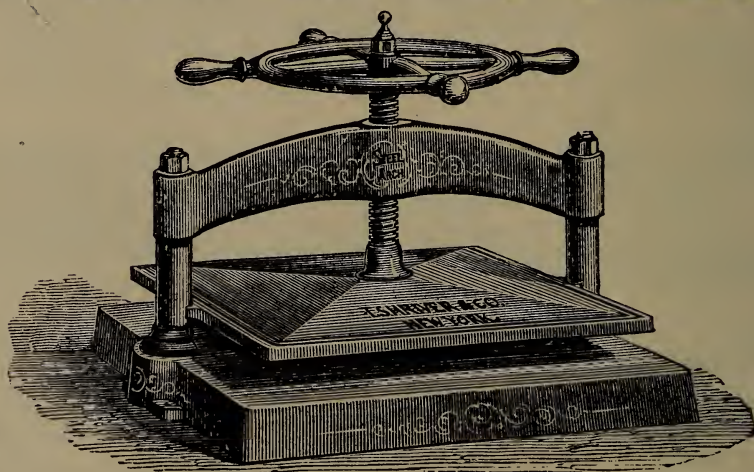
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Priced Catalogues and Discounts on Application.

HOPKINS' HANDY NOTES AND QUERIES.

Furnished by JOHN A. ROEBLING'S SONS CO.,

WIRE STANDARD HOISTING ROPES,

With 19 Wires to the Strand.

TRADE NUMBERS, SIZES, WEIGHT AND STRENGTH.

IRON.

Trade No.	Diameter.	Circumference in inches.	Weight per foot in lbs. of Rope with Hemp Cen	Breaking strain in tons of 2,000 pounds.	Proper working load in tons of 2,000 lbs.	Circumference of Hemp Rope of equal str.	Min. size of drum or sheave in feet.
1..	2¼	6¾	8.00	.74	15	15½	.9
2..	2	6	6.30	.65	13	14½	.7
3..	1¾	5½	5.25	.54	11	13	.6½
4..	1½	5	4.10	.44	9	12	.5
5..	1½	4¾	3.65	.39	8	11½	.4¾
5½	1½	4½	3.00	.33	6½	10¼	.4½
6..	1¼	4	2.50	.27	5½	9½	.4
7..	1¼	3½	2.00	.20	4	8	.3½
8..	1	3½	1.58	.16	3	7	.3
9..	¾	2¾	1.20	.11½	2½	6	.2¾
10..	¾	2¼	.0.88	.0.84	1¾	5	.2½
10¼	¾	2	.0.70	.5.13	1¼	4½	.2
10½	9-16	1½	.0.44	.4.27	¾	4	.1¾
10¾	¾	1½	.0.35	.3.48	½	3½	.1½

CAST STEEL.

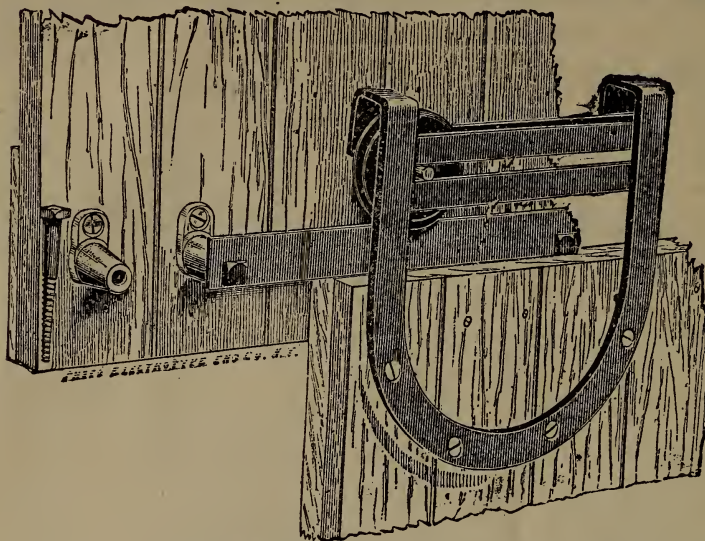
Trade No.	Diameter.	Circumference in inches.	Weight per foot in lbs. of Rope with Hemp Cen	Breaking strain in tons of 2,000 pounds	Proper working load in tons of 2,000 lbs.	Circumference of Hemp Rope of equal str.	Min. size of drum or sheave in feet.
1..	2¼	6¾	8.00	130	26		.9
2..	2	6	6.30	109	21		.8
3..	1¾	5½	5.25	78	17	15¼	.7½
4..	1½	5	4.10	64	13	14½	.6
5..	1½	4¾	3.65	55	11	13½	.5½
6..	1¼	4	2.50	39	8	11½	.5
7..	1¼	3½	2.00	20	6	10	.4¾
8..	1	3½	1.58	24	5	9¼	.4
9..	¾	2¾	1.20	20	4	8	.3¾
10..	¾	2¼	.0.88	13	3	6¾	.3¾
10¼	¾	2	.0.70	9	2	5½	.3
10½	9-16	1½	.0.44	6½	1½	4¾	.2¾
10¾	¾	1½	.0.35	5½	1	4½	.2

NOTE.—The weights given are for *Hemp Center Ropes*. The weight of Wire Center Ropes is 10 per cent. more than that for Ropes with Hemp Centers.

For safe working load, allow one-fifth to one-seventh of the ultimate strength, according to speed, so as to get good wear from the rope. When substituting wire rope for hemp rope, it is good economy to allow for the former the same weight per foot which experience has approved for the latter.

LANE'S PATENT STEEL DOOR HANGER.

The most perfect Anti-Friction Hanger in the Market,



BECAUSE

It is made of steel throughout, except the wheel, which has a steel axle. It will not break. It is practically free from wear. It is almost noiseless in action. It requires no oil. It has a broad bearing on the door and keeps in line. It is by far the most durable. It may be used with any track. It is always in order.

LANE'S PATENT TRACK

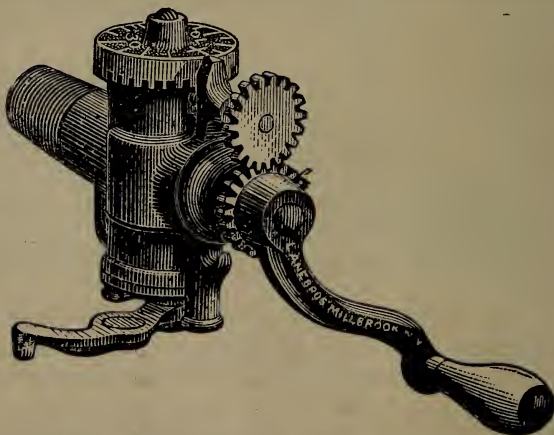
Is made of steel and is easily put in position. Catches and holds no snow or ice. Door hung thereon cannot jump the track. Is not subject to decay. Requires no fitting, but is ready at once. May be used with hangers of other manufacture.

LANE'S MEASURING FAUCET.

PRICE, \$3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any Measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.



Manufactured Exclusively by
LANE BROS., Poughkeepsie, N. Y.

GENERAL AGENCY,

JOHN H. GRAHAM & CO., 113 Chambers St., New York.

HOPKINS' HANDY NOTES AND QUERIES.

TABLE

SHOWING THE DIAMETER IN DECIMALS OF AN INCH, AND THE NUMBER OF FEET IN ONE POUND OF EACH GAUGE IRON WIRE, AS DRAWN BY THE UNITED STATES MANUFACTURERS.

No.	Decim'ls of inch.	Feet in pound.	No.	Decim'ls of inch.	Feet in pound.
000	.362	2.873	15	.072	72.984
00	.331	3.444	16	.063	95.396
0	.323	3.619	17	.054	129.873
1	.283	4.698	18	.047	172.401
2	.263	5.444	19	.040	222.222
3	.244	6.333	20	.033	301.249
4	.225	7.460	21	.030	370.036
5	.207	8.809	22	.026	476.190
6	.192	10.270	23	.022	640.74
7	.177	12.047	24	.020	879.03
8	.162	14.365	25	.017	1189.71
9	.148	17.238	26	.015	1485.62
10	.135	20.698	27	.014	1872.71
11	.120	26.174	28	.012	2361.42
12	.105	34.254	29	.011	2978.91
13	.092	44.655	30	.010	3754.83
14	.080	59.174			

TABLE

SHOWING CORRESPONDING SIZES OF STEEL WIRE OR RODS, TO THE DIVISIONS OF AN INCH.

Nos.	2	12	21	28	30	35	42	48	52	56	61
	7-32	3-16	5-32	9-64	1-8	7-64	3-32	5-64	1-16	3-64	1-32

MESH OF COAL SCREENS.

USED BY THE PRINCIPAL COAL DEALERS.

2½, 2¼ and 2 inch	.....	Screens	Furnace Coal.
1¾ and 1½	“	.....	“ Stove out of Egg Coal.
1¼ and 1	“	.....	“ Nut out of Stove “
¾ and ⅝	“	.....	“ Stove Coal.
½ and ⅜	“	.....	“ Nut “
¼	“	.....	“ Pea “
3-16	“	.....	“ Brickmakers' Dust.

Knight's New Mechanical Dictionary.

A Description of Tools, Instruments, Machines, Processes and Engineering.
WITH INDEXICAL REFERENCES to TECHNICAL JOURNALS. (1876-1880.)

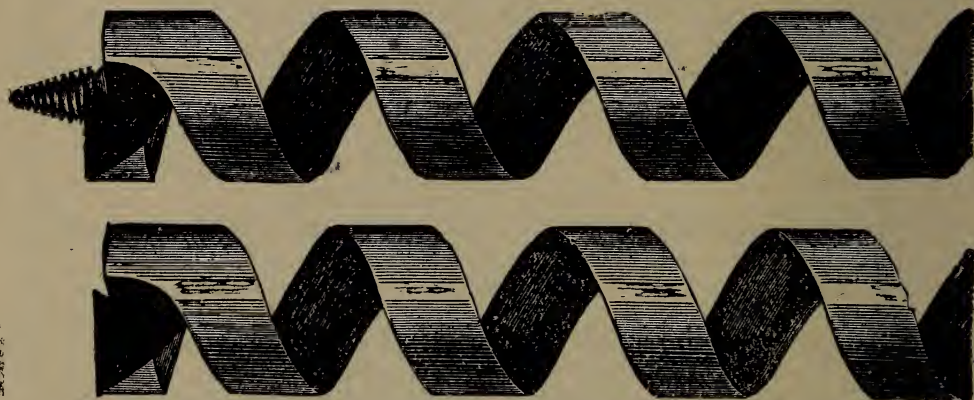
BY EDWARD H. KNIGHT, A. M., LL.D.,

THE RIVERSIDE PRESS, - - - - CAMBRIDGE, MASS.

The march of mechanical improvement in the five years that have elapsed since the completion of Knight's American Mechanical Dictionary renders it necessary to issue another volume, to keep the work abreast of the times. The two great exhibitions, at Philadelphia and Paris—with each of which the author was officially connected as delegate or commissioner and as a member of the respective juries—have brought forward a world of new matter; and the records of our own Patent Office, as well as the testimony of our technical journals, bear witness to the fact that at no period has invention been more fertile, more brilliant, or more important. To be complete in Four Sections, of 240 pages each, at \$2 per Section.—If there is no agent in your vicinity, write to the publishers and they will direct an agent to call on you or see that you are supplied.

HOUGHTON, MIFFLIN & CO., Boston, Mass.

Snell Manufacturing Company's IMPROVED SHIP AUGERS AND SHIP AUGER BITS.



These goods are produced from a special steel by NEW AND IMPROVED MACHINERY, and the labor is performed by skilled mechanics who have made the manufacture of these goods a special study for many years—thus enabling us to place upon the market Ship Augers SUPERIOR TO ANY EVER BEFORE MADE. They are so finished as to bore endwise or with the grain as readily as across it, or through the knottiest timber without swerving.

ALSO MANUFACTURERS OF CAR BITS AND A FULL
LINE OF BORING TOOLS.

**SNELL MANUFACTURING CO.,
FISKDALE, MASS.**

BATES & WILSON, SOLE AGENTS, 80 CHAMBERS STREET, NEW YORK.

HOPKINS' HANDY NOTES AND QUERIES.

TABLE

SHOWING AVERAGE WEIGHT PER FATHOM, ADMIRALTY TEST, AND SIZES OF CHAINS REQUIRED FOR VESSELS, ACCORDING TO THEIR REGISTERED TONNAGE. FOR LOW DECK VESSELS ADD ONE FIFTH TO THE TONNAGE.

Size. Inches.	Common Coil Weight in 100 feet.	Proved. Av'g Weight per Fathom		Size of Rope. Inches.	Proof.		Ship's Ton- nage.	Size of Anchor.
		Stud.	Short Link.		Cable Chain.	B B B Crane Chain.		
3-16	50	.....	4	1	.....	.....	.....	.....
$\frac{1}{4}$	80	.....	6	$1\frac{1}{8}$	1	$1\frac{1}{2}$	.....	.....
5-16	100	.....	7	$2\frac{1}{8}$	$1\frac{1}{8}$	2	.....	.....
$\frac{3}{8}$	140	.....	9	$3\frac{1}{4}$	2	3	.....	.....
7-16	210	.....	12	4	3	4	.....	.....
$\frac{1}{2}$	265	.....	15	$4\frac{3}{4}$	4	5	30	150
9-16	320	.....	19	$5\frac{1}{2}$	5	6	50	200
$\frac{5}{8}$	420	.....	25	$6\frac{1}{2}$	6	8	75	300
11-16	500	.....	3	7	8	10	100	400
$\frac{3}{4}$	590	33	35	$7\frac{1}{4}$	10	12	100	500
13-16	680	33	40	$8\frac{1}{2}$	12	14	110	600
$\frac{7}{8}$	790	43	46	$9\frac{1}{4}$	14	16	130	700
15-16	.....	50	54	10	16	18	160	800
1	.....	53	61	$10\frac{3}{4}$	18	22	200	900
1 1-16	.....	65	69	$11\frac{1}{4}$	20	26	240	1,100
$1\frac{1}{8}$	.....	72	76	12	23	28	280	1,300
1 3-16	.....	80	85	$12\frac{3}{4}$	26	30	320	1,450
$1\frac{1}{4}$	.....	89	95	$13\frac{1}{2}$	28	34	360	1,600
1 5-16	.....	98	104	$14\frac{1}{4}$	30	37	400	1,750
$1\frac{3}{8}$	.....	110	115	15	34	41	440	1,900
1 7-16	.....	118	125	$15\frac{1}{2}$	37	44	500	2,100
$1\frac{1}{2}$	.....	128	135	16	41	48	550	2,300
1 9-16	.....	133	148	$16\frac{1}{2}$	44	52	600	2,500
$1\frac{5}{8}$	.....	150	160	$17\frac{1}{4}$	48	66	700	2,700
1 11-16	.....	161	.....	18	52	.....	850	2,900
$1\frac{3}{4}$	.....	175	.....	$18\frac{1}{2}$	56	.....	1,000	3,100
1 13-16	.....	188	.....	$19\frac{1}{4}$	60	.....	1,150	3,300
$1\frac{7}{8}$	.....	200	.....	20	64	.....	1,300	3,500
1 15-16	.....	215	.....	21	68	.....	1,450	3,700
2	.....	230	.....	22	72	.....	1,600	3,900
$2\frac{1}{8}$	.....	250	.....	.....	80	.....	2,000	4,300
$2\frac{1}{4}$	.....	290	.....	.....	88	.....	2,500	4,700

$\frac{3}{8}$ inch and smaller chains are made of full size iron; all other sizes exact. Tested to the English Admiralty Standard.

German Coil Chain.

Wire Gauge.....	5	6	7	8	9	10	11	12	13
Number.....	000	00	0	1	2	3	4	5	6
Weight in lbs. of 100 feet...	37	$30\frac{1}{2}$	24	19	$14\frac{3}{4}$	$11\frac{1}{4}$	$8\frac{3}{4}$	7	$4\frac{1}{4}$
Breaking Strength.....	695	580	520	488	360	322			

TRAVERS BROTHERS,

107 DUANE St. and 16 THOMAS St.,
NEW YORK.

Manufacturers and Sole Agents for

Peerless Sash Cords Twines

BRAIDED EDGE
MEXICAN HAMMOCKS.

PEERLESS HAMMOCK SPREADERS,
ANCHOR HAMMOCK ROPES,

LIBERTY MILLS

TWINES and CORDS,

Harmony Mills Twines and Cords,

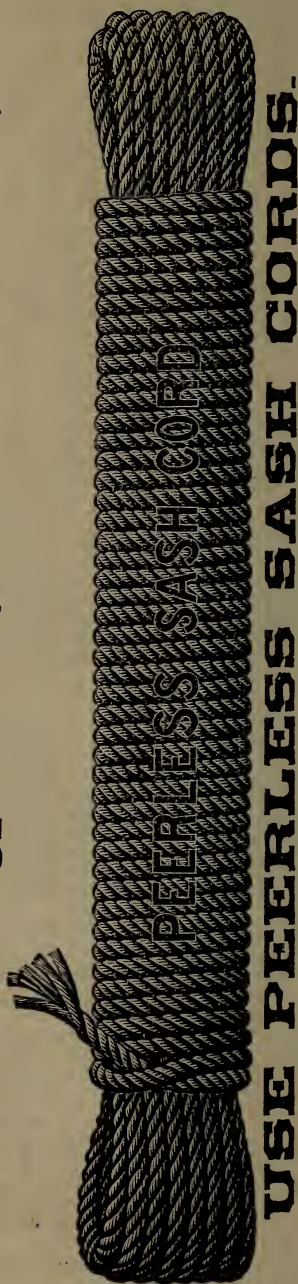
Peerless Sea Island Twines,

GEM SEA ISLAND and COTTON TWINES,

Peerless Hammock Hooks.

AGENTS FOR
THE SILVER LAKE COMPANY'S
SOLID BRAIDED
SASH CORDS AND LINES.

Office and Salesrooms,
107 Duane st. and 16 Thomas st.,
NEW YORK CITY.



HOPKINS' HANDY NOTES AND QUERIES.

APPROXIMATE WEIGHT and STRENGTH of CORDAGE.

Furnished by L. Waterbury & Co., New York City.

Circumference in inches.	Diameter in inches.	Weight of 100 fathoms or 600 ft. in lbs.	Weight of 100 Fathoms, Tarred in lbs.	Strength of New Ropes, in lbs.	No. of feet in 1 lb.
6 thd.	$\frac{3}{16}$ in.	12	17	540	50 feet,
9 "	$\frac{1}{4}$ "	18	24	780	33 " 4 in.
12 "	$\frac{5}{16}$ "	24	34	1000	25 " "
15 "	$\frac{3}{8}$ "	30	45	1280	20 " "
$1\frac{1}{4}$ in.	$\frac{7}{16}$ "	37	50	1562	17 " 8 in.
$1\frac{1}{2}$ "	$\frac{1}{2}$ "	46	55	2250	13 " "
$1\frac{3}{4}$ "	$\frac{9}{16}$ "	65	85	3062	9 " 3 in.
2 "	$\frac{5}{8}$ "	80	100	4000	7 " 6 in.
$2\frac{1}{4}$ "	$\frac{3}{4}$ "	98	125	5000	6 " "
$2\frac{1}{2}$ "	$\frac{7}{8}$ "	120	155	6250	5 " "
$2\frac{3}{4}$ "	$\frac{1}{2}$ in.	142	190	7500	4 " 3 in.
3 "	1 "	170	225	9000	3 " 6 in.
$3\frac{1}{4}$ "	$1\frac{1}{16}$ in.	200	265	10500	3 " "
$3\frac{1}{2}$ "	$1\frac{1}{8}$ "	230	300	12250	2 " 7 in.
$3\frac{3}{4}$ "	$1\frac{1}{4}$ "	271	350	14000	2 " 3 in.
4 "	$1\frac{1}{2}$ "	310	405	16000	1 " 11 in.
$4\frac{1}{4}$ "	$1\frac{3}{8}$ "	346	455	18062	1 " 8 in.
$4\frac{1}{2}$ "	$1\frac{1}{2}$ "	390	510	20250	1 " 6 in.
$4\frac{3}{4}$ "	$1\frac{5}{8}$ "	435	575	22500	1 " 5 in.
5 "	$1\frac{3}{4}$ "	480	640	25000	1 " 3 in.
$5\frac{1}{2}$ "	$1\frac{7}{8}$ "	581	775	30250	1 " "
6 "	2 "	678	930	36100	10 $\frac{1}{2}$ in.
$6\frac{1}{2}$ "	$2\frac{1}{16}$ in.	797	1075	42250	9 in.
7 "	$2\frac{1}{8}$ "	920	1245	49000	7 $\frac{3}{4}$ in.
$7\frac{1}{2}$ "	$2\frac{1}{4}$ "	1106	1405	56250	6 $\frac{3}{4}$ in.
8 "	$2\frac{1}{2}$ "	1265	1600	64000	5 $\frac{3}{4}$ in.
$8\frac{1}{2}$ "	$2\frac{3}{8}$ "	1420	1780	72250	5 in.
9 "	3 "	1572	2030	81000	4 $\frac{1}{2}$ in.
$9\frac{1}{2}$ "	$3\frac{1}{8}$ "	1760	2285	90250	4 in.
10 "	$3\frac{3}{16}$ in.	1951	2550	100000	3 $\frac{3}{4}$ in.

The relative strength of Manila to Sisal is about as 7 is to 5; or Manila is about 25 per cent. stronger than Sisal. Hawser-laid Rope will weigh one-sixth less.

Number of Railroad Spikes Used to One Mile of Track.

Size measured under head.	Average No. per keg of 200 lbs.	Ties 2 feet between centers, 4 spikes per tie makes per mile.	Rail used, weight per yard.
$5\frac{1}{2}$ x $\frac{9}{16}$	375	5870 lbs = 29 $\frac{1}{3}$ kegs.	45 to 70
5 x $\frac{9}{16}$	400	5170 " = 26 " "	40 to 56
5 x $\frac{7}{8}$	450	4660 " = 23 $\frac{1}{3}$ " "	35 to 40
$4\frac{1}{2}$ x $\frac{7}{8}$	530	3960 " = 20 " "	28 to 35
4 x $\frac{7}{8}$	600	3520 " = 17 $\frac{2}{3}$ " "	24 to 35
$4\frac{1}{2}$ x $\frac{7}{16}$	680	3110 " = 15 $\frac{1}{2}$ " "	} 20 to 30
4 x $\frac{7}{16}$	720	2910 " = 14 $\frac{1}{2}$ " "	
$3\frac{1}{2}$ x $\frac{7}{16}$	900	2350 " = 11 " "	} 16 to 25
4 x $\frac{3}{4}$	1009	2090 " = 10 $\frac{1}{2}$ " "	
$3\frac{1}{2}$ x $\frac{3}{4}$	1190	1780 " = 9 " "	} 16 to 20
3 x $\frac{3}{4}$	1240	1710 " = 8 $\frac{1}{2}$ " "	
$2\frac{1}{2}$ x $\frac{3}{4}$	1342	1575 " = 7 $\frac{3}{4}$ " "	12 to 16

SEE PAGE 119.



Established 1855. Centennial Award 1876.

KEYSTONE WORKS.

GEORGE GRIFFITHS CO.

MANUFACTURER OF

SOLID CAST STEEL

Shovels, Spades and Scoops

—AND—

DRAINAGE TOOLS,

Quality and Finish Guaranteed.

**We make Drain Cleaners,
ALL SIZES.**

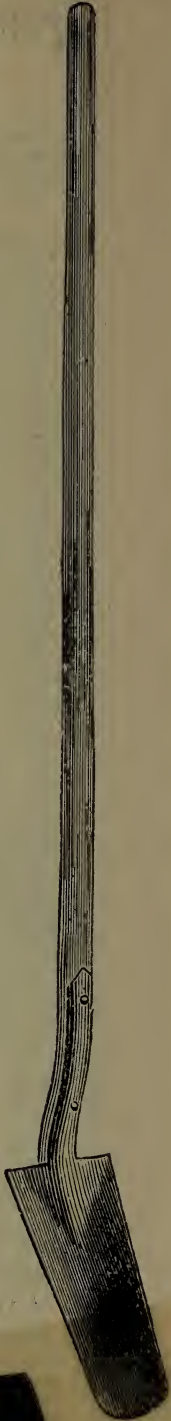

Cast-Steel Wire Potato Scoops.

Malleable Iron Screening Scoops.

Shovel, Spade and Fork Handles.
Coal Hods, Well Buckets, Chamber
Pails, Ash Cans and Ash Bar-
rels, Stove Shovels, Pokers,
Pans, Etc.

**NOS. 511, 513 & 515 LOCUST ST.,
Philadelphia, Pa., U. S. A.**

Send for Price List.



HOPKINS' HANDY NOTES AND QUERIES.

OVAL SLIDE VISES.

SIZES OF SCREWS AND LENGTH OF JAWS.

Nos.	00	0	1	2	3	4
Sizes of Screws .....inches	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$
Length of Jaws .....inches	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Weight, pounds.....	$7\frac{3}{4}$	11	18	29	$36\frac{1}{2}$	54

SOLID BOX VISES.

LENGTH OF JAW TO EACH SIZE MANUFACTURED.

Nos.....	35	40	45	50	55	60	65	70	75	80	85	90
Length of Jaws inches.....	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5	5	$5\frac{1}{4}$	$5\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$5\frac{3}{4}$
Weight, pounds (about)	35	40	45	50	55	60	65	70	75	80	85	90

SOLID BOX VISES.—(Continued.)

Nos.....	95	100	110	120	130	140	150	160	170	180	190	200
Length of Jaws inches.....	$5\frac{1}{4}$	6	6	$6\frac{1}{2}$	$6\frac{1}{2}$	7	7	$7\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	8
Weight, pounds (about)	95	100	110	120	130	140	150	160	170	180	190	209

Rope and Iron Strapped Tackle Blocks.

DIAMETER OF SHEAVES, AND SIZE OF ROPE TAKEN BY EACH.

Length of Blocks, inches.	4	5	6	7	8
Diameter of Wheels, "	$2\frac{1}{2}$	3	$3\frac{1}{2}$	$4\frac{1}{4}$	5
Diameter of Rope, "	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1

Length of Blocks, inches.	9	10	11	12
Diameter of Wheels, "	$5\frac{3}{4}$	$6\frac{1}{2}$	$7\frac{1}{4}$	8
Diameter of Rope, "	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$

Thick Mortise Blocks.

Length of Blocks,	inches.	9	10	11	12	15
Diameter of Wheels,	"	5¾	6½	7¼	8	
Diameter of Rope,	"	1¼	1⅜	1½	1½	

Size of Fry Pans.

No.....	0	1	2	3	4	5	6	7	8
Size across top.	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10	$11\frac{1}{4}$	12	13	14 inch.

“WESTERN” FILES,

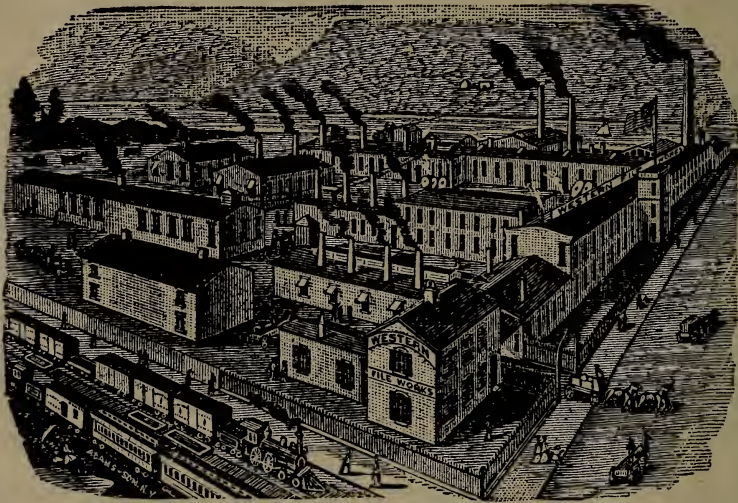
BEST CAST STEEL FILES,

WARRANTED TO BE UNEQUALLED IN THE MARKET,

FOR SALE BY

Iron and Hardware Dealers

THROUGHOUT THE UNITED STATES AND CANADA.



All Descriptions of Files

MADE TO ORDER.

WESTERN FILE CO., Limited.

BEAVER FALLS,

PENNSYLVANIA.

REGULAR STANDARD SIZES OF FILES.

[Expressed as nearly as possible without the use of Decimals.]

Length.	Mill-Saw Files.	Flat.	Hand.	Half Round.	Round and Square.	Cabinet Files.	Regular Taper Files.	Slim Taper Files.	Pit Saw Files.	Warding Files.
3 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
3½ in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
4 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
4½ in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
5 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
5½ in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
6 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
6½ in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
7 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
8 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
9 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
10 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
11 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
12 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
13 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
14 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
15 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
16 in.	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

This Table of Sizes will give consumers, and all persons concerned in the use of Files, a fair idea of the sizes of the full parts of Files most generally used. It will also be found useful to persons who generally want Files of a certain width or thickness, and who may not know the corresponding length of such Files

RICHARDSON'S CELEBRATED SAWS

Are Unequalled for Quality, Temper and Workmanship. Taper Ground, Thin at Back, and Perfectly True, AND HAVE JUSTLY ATTAINED AN ENVIABLE REPUTATION.

WE MAKE A FULL LINE OF

HAND, COMPASS, PANEL, BUTCHERS', RIP, BACK, CIRCULAR, MILL, and CROSS CUT SAWS.

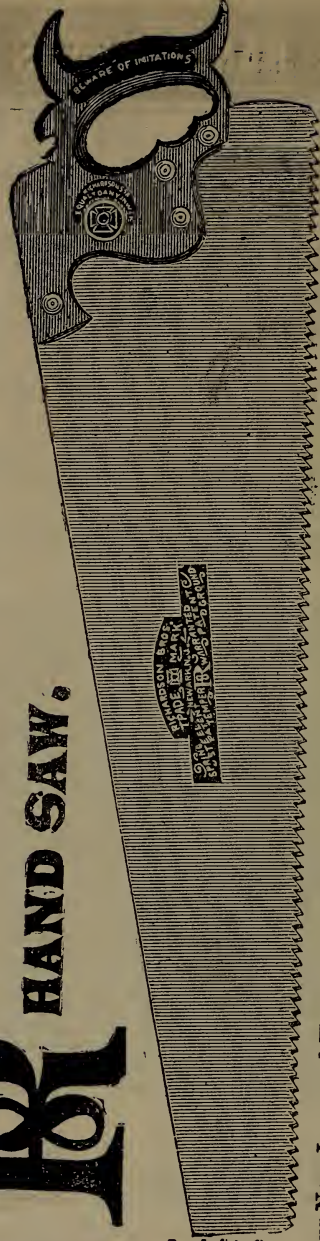
Illustrated Catalogue sent on application.



Richardson's Trade Mark.

A Maltese Cross, with the letters B E S T, emblematical of the standing of the Saws in the Trade.

HAND SAW.



We give an illustration of our New Improved Hand Saw, which combines the most practical improvement yet offered on Saws. The position of the handle brings the blade or heel of the Saw nearer the hand, which makes it hang much lighter, and together with the additional Rivet, makes it the strongest and best Hand Saw in the market. We make this Saw in all lengths, and style it our **R** For price add \$1.00 to List on regular No. 8.

SPECIAL SAWS, OR ANY SAWS NOT ON OUR LIST, MADE TO ORDER.

Richardson's Saw Works, 15 to 27 River St., Newark, N.J., U.S.A.

HOPKINS' HANDY NOTES AND QUERIES.

Standard Sizes of Circular Saw Mandrels.

No.	Diameter of Pulley.	Face of Pulley.	Diameter of Flange.	Length of Shaft.	Diameter of Shaft.	Size of Hole in Saw.
1	2½ ins.	3½ ins.	2½ ins.	14 ins.	1 1-16 in.	1 in.
2	3 "	4 "	3 "	16 "	1 3-16 "	1 1/8 "
3	3½ "	4½ "	3½ "	18 "	1 5-16 "	1 1/4 "
4	4 "	5 "	4 "	20 "	1 7-16 "	1 5-16 "
5	4½ "	5½ "	4½ "	22 "	1 7-16 "	1 5-16 "
6	5 "	6 "	5 "	24 "	1 7-16 "	1 3/8 "
7	5½ "	6½ "	5½ "	26 "	1 7-16 "	1 1/2 "
8	6 "	7 "	6 "	28 "	1 9-16 "	1 13/16 "
9	7 "	8 "	6 "	32 "	1 11-16 "	1 15/16 "
10	8 "	8 "	6 "	36 "	1 13-16 "	1 15/16 "

When Ordering Circular Saws,

The following directions should be explicitly given :

Diameter of Saw in inches.

Thickness (or Gauge) of Saw at Rim.

Thickness (or Gauge) of Saw at Centre.

Log side, right or left hand, saw *cutting towards you*.

Number of Teeth in Saw.

Kind and number of Tooth.

Size of mandrel hole.

Size of pin hole.

Distance between pin holes from centre to centre.

Standard Gauges for Circular and Mill Saws.

Gauge.

No. 4.....	1/4 inch, scant.
" 5.....	7-32 "
" 6.....	3-16 " full.
" 7.....	3-16 " scant.
" 8.....	5-32 "
" 9.....	5-32 " scant.
" 10.....	1/8 " full.

Gauge.

No. 11.....	1/8 inch, scant.
" 12.....	3-32 " full.
" 13.....	3-32 " scant.
" 14.....	5-64 " full.
" 15.....	5-64 " scant.
" 16.....	1-16 " full.

A PERFECT TOILET SOAP

IS

Lindley M. Elkinton's

PURE PALM

Pressed Cakes, \$1.25 per dozen.

Old Dry Blocks, 10 cents per block.

Bars of Palm, 20 cents per pound.

TEST FOR TOILET SOAP:

Place the tongue on the Soap for one or two minutes, if a stinging sensation is felt, such Soap is not proper to use on the skin.

L. M. ELKINTON,

532 St. John Street, - Philadelphia, Pa.

THE OLD AND ONLY RELIABLE.

LATEST IMPROVED

FORT WAYNE

WESTERN WASHER.

Sold Entirely on its Merits.

We have furnished these Machines to an appreciative public for the past 12 years, during which time the demand for them has increased steadily and rapidly.

Each Machine is Warranted to Give Perfect Satisfaction.

We want this Machine represented in every city and town, and will give liberal discounts to dealers or agents, and guarantee sale and satisfaction of them

PRICE.

No. 1, Family Size. \$ 8 00

No. 2, Large Family 9 00

No. 3, Hotel Size..... 10 00

Write for Catalogue and Terms to



The HORTON MFG. CO., Fort Wayne, Ind., U. S. A.

HOPKINS' HANDY NOTES AND QUERIES.

Standard Length of Cut of Hatchets and Bench Axes.

Nos.....	1	2	3
Shingling	$3\frac{1}{2}$	$3\frac{1}{8}$	$4\frac{3}{8}$ inches.
Claw.....	$3\frac{1}{2}$	$3\frac{1}{8}$	$4\frac{3}{8}$ inches.
Half.....	$3\frac{1}{2}$	$3\frac{1}{8}$	$4\frac{3}{8}$ inches.
Lath	$2\frac{1}{2}$	$2\frac{3}{4}$	3 inches.

No.....	1	2	3	4	5	6	7	8	9
Bench.....	$3\frac{3}{4}$	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{3}{4}$	$7\frac{1}{2}$	$8\frac{1}{4}$	9 inches.

Weights of Washoe (Adz Eye) Picks.

RAILROAD PICKS.

Nos.....	1	2	3	4	5	6	7	8
Weight.....	5	$5\frac{1}{2}$	6	6	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$ lbs.

MINING OR DRIFTING PICKS.

Nos.....	1	2	3	4	5	6	7	8	9
Weight	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7 lbs.

POLL PICKS.

Nos.....	1	2	3	4	5	6	7	8	9
Weight	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$ lbs.

COAL PICKS.

Nos.....	1	2	3	4	5	6
Weight ...	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	$6\frac{1}{2}$ lbs.

Coes' (Genuine) Wrenches.

WILL TAKE NUTS OF THE FOLLOWING SIZES:

Size of Wrench	4	6	8	10	12	15	18	21 in.
Size of Nuts....	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{5}{8}$	3	$4\frac{1}{8}$ in.

Cast Steel Crowbars.

Size	Inches	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
Usual Weight..	Lbs.	6	8	10	13	17	22	26
Usual Length.....	Inches	44	48	52	55	58	66	72

THE SUPERIOR LAWN MOWER.



SOME OF THE

SPECIAL ADVANTAGES

RECOMMENDING IT ARE:

1st—The ease and quickness with which it can be adjusted to cut High and Low grass; in a moment you can vary the cut from one-half to three and one-half inches.

2d—It is the only Mower in the market where the same machine Can, in a Moment, be Adjusted to Cut grass from one to twelve inches high.

3d—Being a Front-Cut Machine the operator is enabled to cut grass close up to walls, fences, trees, etc.

4th—The Reel Knives are protected by a Guard to prevent them from cutting shrubbery, etc.

5th—The ratchet or pawl has no Spring, makes scarcely any noise, *has eight catches in a circumference of three inches*, so that the reel starts to cutting the moment the machine is started forward.

6th—The material used is of the very best quality, so that Breakages Seldom if Ever occur.

7th—The Knives are made by a patented process, *of the best steel*, and are hardened and *tempered in oil*.

8th—They are made with the double gear, giving it ease of motion, combined with strength, enabling one to cut grass rapidly going at a slow rate of speed.

9th—All the Bearings in the Mower are long, so that the wear will be very slow.

10th—Our Pawls will Not Gum or Stick, we therefore, recommend to oil with machine oil. Coal oil will cut the bearings.

11th—The machine is sharpened by a very simple method, so that even a child can sharpen it with the greatest ease. A Crank and full directions accompany each machine.

PRICE LIST:

12 Inch Cut,	-	-	-	\$13.00
14 "	-	-	-	15.00
16 "	-	-	-	17.00

DISCOUNT TO THE TRADE.

MANUFACTURED BY THE

ROGERS FENCE CO.,

Springfield, Ohio.

Sole Agents for New York City,

Quackenbush, Townsend & Co.,

85 Chambers and

67 Reade Sts.

HOPKINS' HANDY NOTES AND QUERIES.

Molasses Gates.

No.....	1	2	3	4	5
Inside Diameter.....	13-15	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
Bore.....	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{5}{8}$	1 13-16

John Wilson's English Butcher Knives.

LENGTH OF BLADE OF EACH NO.

No.....	026	26	27	28	29	30		
Length.....	4½	5	5¼	5½	6	6½	inches.	
No.....	43	44	45	46	47	48	49	56
Length..	7	8	9	10	11	12	13	14 ins.

Eley Bros.' ("E. B.") Percussion Caps

ARE NUMBERED IN THIS MANNER :

Smallest..	No.	9	24	10	11	18	12	13	14	..Largest.
------------	-----	---	----	----	----	----	----	----	----	------------

English Gun Gauge.

SIZES EXPRESSED IN PARTS OF AN INCH.

	Number.												
Bore..	5	6	7	9	11	15	19	25	36	52	90	140	300
Inch..	1	15-16	$\frac{7}{8}$	13-16	$\frac{3}{4}$	11-16	$\frac{5}{8}$	9-16	$\frac{1}{2}$	7-16	$\frac{3}{8}$	5-16	$\frac{1}{4}$

The Sizes of Skates

COMPARE WITH SIZES OF SHOES AS FOLLOWS :

Skates, Inches..	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10	$10\frac{1}{2}$	11	$11\frac{1}{2}$
Shoes, No.....	$9\frac{1}{4}$	11	$12\frac{1}{2}$	1	$2\frac{1}{2}$	4	$5\frac{1}{2}$	$7\frac{1}{2}$	9	$10\frac{1}{2}$

Plate and Bedstead Casters.

SIZE, IN INCHES, OF WHEELS OF EACH.

Plate.....No	1	2	3	4	5	6	7
Size.....	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	1 7-16	$1\frac{1}{2}$
Bedstead, Old No.	158.0	158.1	158.2	2 in 0	2 in 1	2 in 2	2 in heavy.
New "	101	102	103	104	105	106	107
Size.....	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{1}{4}$	$1\frac{1}{8}$	2	$2\frac{1}{4}$

Hatter's Size Measure.

To obtain the correct size of the head, use a strip of paper—newspaper will do. Draw it tightly around the largest part of the head, and have the ends just meet. Then measure the length of the paper and the figures below will give you the size according to hatter's measure. An eighth of an inch either way will make no difference. These measures will answer for any style of hat or cap made:

18 $\frac{1}{4}$ inches is.....	$5\frac{7}{8}$	22 $\frac{1}{4}$ inches is.....	7
19 " " ".....	6	22 $\frac{1}{2}$ " " ".....	$7\frac{1}{8}$
19 $\frac{3}{8}$ " " ".....	$6\frac{1}{8}$	23 " " ".....	$7\frac{1}{4}$
19 $\frac{1}{2}$ " " ".....	$6\frac{1}{4}$	23 $\frac{3}{8}$ " " ".....	$7\frac{3}{8}$
20 $\frac{1}{4}$ " " ".....	$6\frac{3}{8}$	23 $\frac{1}{2}$ " " ".....	$7\frac{1}{2}$
20 $\frac{1}{2}$ " " ".....	$6\frac{1}{2}$	24 " " ".....	$7\frac{5}{8}$
21 " " ".....	$6\frac{5}{8}$	24 $\frac{1}{2}$ " " ".....	$7\frac{3}{4}$
21 $\frac{1}{2}$ " " ".....	$6\frac{3}{4}$	25 " " ".....	$7\frac{7}{8}$
21 $\frac{3}{4}$ " " ".....	$6\frac{7}{8}$	25 $\frac{1}{2}$ " " ".....	8

— THE —
Union Nut Company,

99 Chambers Street

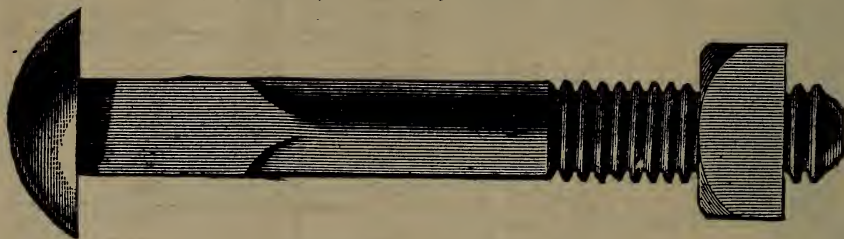
A. S. UPSON, Pres't.
S. FRISBIE, Sec. & Treas.

NEW YORK,

T. SMITH, Ass't Sec.
J. L. VARICK, Ass't Treas.

MANUFACTURERS OF

NUTS AND WASHERS,
CARRIAGE, TIRE, PLOW, STOVE, AGRICULTURAL & MACHINE



BOLTS,

Bolt Ends, Turn Buckles, Lag and Skein Screws,
Carriage Hardware,

Rules, Plumbs and Levels, Try Squares and T Bevels.

MANUFACTORIES,

UNIONVILLE, Conn., & CLEVELAND, Ohio.

AGENTS FOR

THE UPSON NUT CO., UNIONVILLE, CT.

THE UPSON NUT CO., CLEVELAND, O.

HOTCHKISS & UPSON CO.

STANDARD RULE CO.

ATHOL MACHINE CO.

BAILEY WRINGING MACHINE CO.

HOPKINS' HANDY NOTES AND QUERIES.

TABLE

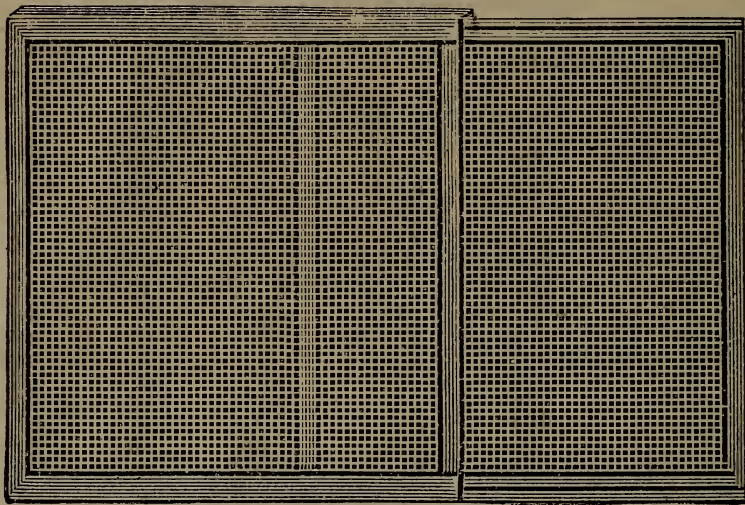
Showing the average number of Cold Pressed Nuts in a keg, 150 lbs. each, Square and Hexagon of standard sizes, as adopted by "the Association of Bolt and Nut Manufacturers of the United States."

WIDTH.	THICKNESS.	HOLE.	BOLT.	NO. OF SQUARE	NO. OF HEXAGON.
11-32	5-32	3-32	1-8	45,000	
13-32	3-16	5-32	3-16	22,500	
1-2	1-4	7-32	1-4	10,000	10,500
5-8	5-16	9-32	5-16	5,106	6,666
3-4	3-8	11-32	3-8	2,727	4,528
7-8	7-16	13-32	7-16	1,904	2,057
7-8	1-2	7-16	1-2	1,695	1,890
1	1-2	7-16	1-2	1,218	1,538
1 1-8	1-2	1-2	4-16	1,016	1,245
1 1-8	5-8	9-16	5-8	885	957
1 1-4	5-8	9-16	5-8	638	740
1 3-8	3-4	21-32	3-4	450	555
1 1-2	3-4	21-32	3-4	368	430
1 5-8	7-8	25-32	7-8	260	270
1 3-4	7-8	25-32	7-8	243	252
1 3-4	1	7-8	1	249	257
2	1	7-8	1	163	204
2	1 1-8	15-16	1 1-8	143	168
2 1-4	1 1-8	15-16	1 1-8	109	150
2 1-4	1 3-8	1 1-16	1 3-8	85	120
2 1-2	1 1-4	1 1-16	1 1-4	84	93
2 3-4	1 3-8	1 3-16	1 3-8	55	60
3	1 1-2	1 5-16	1 1-2	51	56
3 1-4	1 5-8	1 7-16	1 5-8	39	44
3 1-2	1 3-4	1 9-16	1 3-4	32	35
3 3-4	1 7-8	1 11-16	1 7-8	28	30
4	2	1 13-16	2	20	22

BAR AND SHEET LEAD—Weight in Pounds

Thickness, or Diameter, or Side; inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Side; inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	3.71	.02	.014	1 1-16	63.2	5.6	4.4
1-8	7.43	.079	.06	1-8	66.87	6.26	4.91
3-16	11.15	.175	.138	3-16	70.51	6.93	5.5
1-4	14.03	.31	.245	1-4	74.35	7.74	6.1
5-16	14.03	.486	.33	5-16	78.05	8.55	6.73
3-8	22.02	.695	.542	3-8	81.76	9.38	7.38
7-16	26.	.943	.745	7-16	85.43	10.18	8.05
1-2	29.75	1.25	.975	1-2	89.23	11.0	8.75
9-16	33.49	1.55	1.24	9-16	93.	12.05	9.50
5-8	37.18	1.95	1.51	5-8	96.73	13.15	10.25
11-16	40.87	2.33	1.85	11-16	100.5	14.15	11.06
3-4	44.53	2.8	2.2	3-4	104.1	15.18	11.88
13-16	48.23	3.23	2.58	13-16	107.3	16.30	12.76
7-8	52.12	3.8	2.93	7-8	112.3	17.45	13.66
15-16	56.05	4.35	3.41	15-16	116.	18.10	14.61
1	59.43	4.95	3.9	2	119.6	19.73	15.53

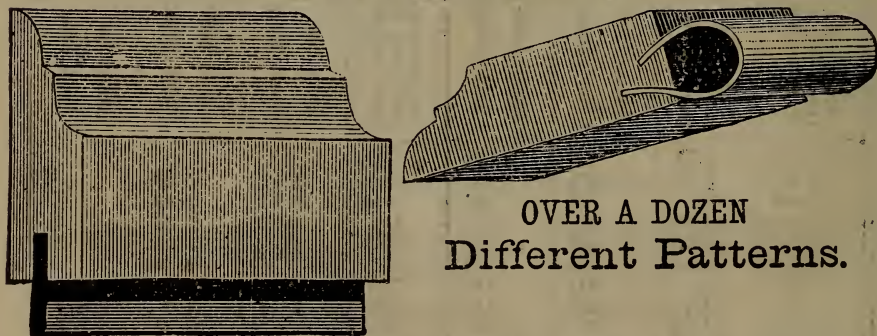
ROEBUCK'S Adjustable Wire Window Screens.



WILL FIT ANY WINDOW.

ROEBUCK'S CELEBRATED WEATHER STRIPS.

THE BEST IN USE.



OVER A DOZEN
Different Patterns.

S. ROEBUCK,
164 FULTON STREET,
NEW YORK.

HOPKINS' HANDY NOTES AND QUERIES.

TABLE

SHOWING THE AVERAGE NUMBER OF WASHERS IN A KEG OF 150
LBS., OF EACH STANDARD SIZE,

As Adopted by "The Association of Bolt and Nut Manufacturers of the U. S."

Diameter.	Size of Hole	Thickness Wire Gauge.	Size of Bolt	No. in 150 lbs
1-2	1-4	No. 18	3-16	80.000
5-8	5-16	" 16	1-4	34.285
3-4	5-16	" 16	1-4	22.000
7-8	3-8	" 16	5-16	18.500
1	7-16	" 14	3-8	10.550
1 1-4	1-2	" 14	7-16	7.500
1 3-8	9-16	" 12	1-2	4.500
1 1-2	5-8	" 12	9-16	3.850
1 3-4	11-16	" 10	5-8	2.500
2	13-16	" 10	3-4	1.600
2 1-4	15-16	" 9	7-8	1.300
2 1-2	1 1-16	" 9	1	950
2 3-4	1 1-4	" 9	1 1-8	700
3	1 3-8	" 9	1 1-4	550
3 1-2	1 1-2	" 9	1 3-8	450

PERKINS HORSE SHOES.

Weight expressed in ounces.

Front Shoes, No.	0	1	2	3	4	5	6	7	8
Light.....	13	15	17	21	24	29	35		
Medium.....		17	20	24	28	34	38		
Heavy.....		19	22	27	32	36	41	49	54
Hind Shoes, No..	0	1	2	3	4	5	6	7	8
Light	10	12	15	18	22	26	31		
Medium		14	16	20	24	28	33		
Heavy		14	17	21	25	30	34	38	43
Mule, No.....	1	2	3	4	5	6	7		
Front Shoes.....	10	12	15	18	22	25	29		

"Ausable" Horse Shoe Nails.

STANDARD SIZES.

No.....	4	5	6	7	8	9	10	12
Length in inches.	1 $\frac{5}{8}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{7}{16}$	2 $\frac{9}{16}$	2 $\frac{11}{16}$	3 $\frac{1}{16}$
Number in pound	276	168	138	110	96	80	73	57

SHIPPERS

CAN SAVE TIME
AND TROUBLE
AND CASH



BY USING
BARLOW'S
PATENT
MANIFOLD
SHIPPING
BLANKS. SEND FOR
SAMPLE SHEET AND PRICES
BARLOW BROS. GRAND RAPIDS, MICH.



ADJUSTABLE BACKS GRATES AND LININGS

For Cook and Heating Stoves.



Endorsed by all who have used them. If not for sale by your jobber, address

Schenck's Adjustable Fire Back Company,
94 Market Street, - Chicago, Ill.

8oz. T 10oz. T 12oz. T 1lb. T

1 1/4lb. T 1 1/2lb. T 1 3/4lb. T 2lb. T



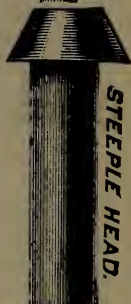
ROUND HEAD.

RIVETS

OF EVERY
DESCRIPTION, FIRST QUALITY.



FLAT HEAD



STEEPLE HEAD.



BELT RIVET.

W.P. TOWNSEND & CO.



COUNTERSUNK HEAD.



WAGON BOX HEAD.

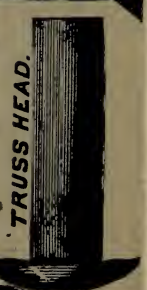


CONE HEAD.

NEW BRIGHTON, PA.



ROSE HEAD.



TRUSS HEAD.

5lb.

6lb.

7lb.

8lb.

10lb.

12lb.

HOPKINS' HANDY NOTES AND QUERIES.

PROPORTIONS FOR United States Standard Screw Threads and Nuts. From HOOPES & TOWNSEND.

Diameter of Screw.	Threads per inch.	Diameter at root of Thread.	Short Diameter.	Long Diameter.	Long Diameter	Thickness
1-4	20	.185	1-2	37-64	7-10	1-4
5-16	18	.240	19-32	11-16	10-12	5-16
3-8	16	.294	11-16	51-64	63-64	3-8
7-16	14	.344	25-32	9-10	1 7-64	7-16
1-2	13	.400	7-8	1	1 15-64	1 2
9-16	12	.454	31-32	1 1-3	1 23-64	9-16
5-8	11	.507	1 1-16	1 7-32	1 1-2	5-8
3-4	10	.620	1 1-4	1 7-16	1 49-64	3-4
7-8	9	.731	1 7-16	1 21-32	2 1-32	7-8
1	8	.837	1 5-8	1 7-8	2 19-64	1
1 1-8	7	.940	1 13-16	2 3-32	2 9-16	1 1-8
1 1-4	7	1 065	2	2 5-16	2 53-64	1 1-4
1 3-8	6	1.160	2 3-16	2 17-32	3 3-32	1 3-8
1 1-2	6	1.284	2 3-8	2 3-4	3 23-64	1 1-2
1 5-8	5 1-2	1.389	2 9-16	2 31-32	3 5-8	1 5-8
1 3-4	5	1.491	2 3-4	3 3-16	3 57-64	1 3-4
1 7-8	5	1.616	2 15-16	3 13-32	4 5-32	1 7-8
2	4 1-2	1.712	3 1-8	3 5-8	4 27-64	2
2 1-4	4 1-2	1.962	3 1-2	4 1-16	4 61-64	2 1-4
2 1-2	4	2.176	3 7-8	4 1-2	5 31-64	2 1-2
2 3-4	4	2.426	4 1-4	4 29-32	6	2 3-4
3	3 1-2	2.629	4 5-8	5 3-8	6 17-32	3
3 1-4	3 1-2	2.879	5	5 13-16	7 1-16	3 1-4
3 1-2	3 1-4	3.100	5 3-8	6 7-64	7 39-64	3 1-2
3 3-4	3	3.317	5 3-4	6 21-32	8 1-8	3 3-4
4	3	3.567	6 1-8	7 3-32	8 41-64	4

WEIGHT OF STEEL TIRE PER SET OF 54 FEET.

5-8x1-16	3-4x3-32	7-8x3-32	1x1-8	1x5-16	11-4x1-4	11-2x7-16
7 1-2	13 1-4	15 1-4	23 3-4	58 1-2	59	124
5-8x3-32	3-4x1-8	7-8x1-8	1x5-32	11-8x3-16	11-4x5-16	11-2x1-2
11 1-2	18	20 1-4	29 1-2	40 1-2	74	142
5-8x1-8	3-4x5-32	7-8x5-32	1x3-16	11-8x1-4	11-4x3-8	15-8x1-2
15 1-4	22	25	35 1-2	54	88 1-2	154
5-8x3-16	3-4x3-16	7-8x3-16	1x7-32	11-8x5-16	13-8x3-8	13-4x1-2
22 3-4	27	30 1-2	42 1-4	67 1-2	98	165
7-8x7-32	3-4x1-4	7-8x1-4	1x1-4	11-8x3-8	11-2x3-8	2x1-2
35 1-2	35 1-2	40 1-2	47 1-2	81	107	190

Have a clean fire: and weld with equal parts of Borax,
Salt and Sand.

JOHN H. GRAHAM.

WM. A. GRAHAM.

JOHN H. GRAHAM & CO.,

ESTABLISHED 1870.

P.-O. Box 1042. 113 Chambers St. and 95 Reade St., New York.

Hardware Manufacturers' Agents.

All Goods at Factory Prices.

- | | |
|--|---|
| <p>AMERICAN SCREW CO.,
Round-head, Flat-head and Brass
Screws.</p> <p>HENRY DISSTON & SONS,
Saws, Tools, Files, &c.</p> <p>HARTFORD HAMMER CO.,
Hammers forged from Solid Cast-
Steel.</p> <p>LANE BROS.,
Grocers, Coffee-mills, Self-Meas-
uring Faucets, &c.</p> <p>IRON CITY TOOL WORKS,
Vises, Picks, Mattocks, Grub-
Hoes, &c.</p> <p>A. W. BRINKERHOFF & SON.
"Universal" Corn-Huskers.</p> <p>BURRELL & WHITMAN.
Butter, Cheese and Flour-Tryers,
&c.</p> <p>TAYLOR BROS.,
Thermometers, Storm Glasses,
&c.</p> <p>P. LOWENTRAUT,
Mechanics' and Plumbers' Tools,
Skates, &c.</p> <p>T. C. RICHARDS HARDWARE CO.,
Bright Wire Goods, Picture-
Nails, &c.</p> <p>DETROIT BLOCK WORKS,
Tackle Blocks, &c.</p> <p>LAWRENCE CURRY-COMB CO.,
Boring Machines, &c.</p> <p>A. G. COES & CO.,
Coes's Genuine Screw Wrenches.</p> <p>ISAAC F. BLOODGOOD CO.,
Sand and Emery Paper, Emery
Cloth, &c.</p> <p>LORING & PARKS,
Tacks, Brads, Nails and Plymouth
Rivets.</p> <p>HARRISBURG HANDLE CO.,
Axe, Pick, Hammer Handles, &c.</p> <p>EDWARD STORM SPRING CO.,
Cannon's Diamond-Point Nail
Sets.</p> <p>BOSTWICK & BURGESS,
Queen Carpet-Sweepers.</p> <p>TUCKER & DORSEY, Alarm Tills.</p> <p>AMERICAN MACHINE CO.,
Freezers, Fluters, Wringers, &c.</p> <p>GAY & PARSONS,
Batchet Screw-Drivers.</p> | <p>D. W. BOSLEY & CO.,
Weather Strip, Window-Cleaners,
&c.</p> <p>CHADBORN & COLDWELL MFG. CO.,
Lawn-Mowers.</p> <p>E. S. HOTCHKISS, Rat-Killers.</p> <p>HOWARD BROS.,
Cotton, Wool and Curry Cards.</p> <p>W. H. HOWELL & CO.,
Geneva Fluter, Laundry Irons, &c.</p> <p>PHOENIX CASTER CO.,
Martin's Patent Casters.</p> <p>DOUBLE-POINTED TACK CO.,
Staples, &c.</p> <p>PORTER MFG. CO., Screen Corners.</p> <p>BARTON BELL CO.</p> <p>UNITED STATES CORD CO.,
Braided Sash Cord.</p> <p>H. KNICKERBACKER,
Scythes, Axes and Tools.</p> <p>G. M. EDDY & CO.,
Measuring Tapes, largest line in
the world.</p> <p>J. MALLINSON,
Cast-Steel Shears and Scissors.</p> <p>DERBY & BALL, Scythe-Snaths.</p> <p>SEYMOUR SMITH & SON,
Breast Drills, Saw Setts, Pruning
Shears, &c.</p> <p>OTSEGO FORK MILLS CO.,
Steel Forks, Rakes, Hoes, &c.</p> <p>C. S. BELL CO.,
Farm and Church Bells.</p> <p>NEW HAVEN COPPER CO.,
Cast-Steel Augers and Bitts, all
kinds and sizes.</p> <p>KENTUCKY BELL CO.,
The "Dodge" Cow-Bell.</p> <p>J. S. COWDERY, Carpenters' Chalk.</p> <p>ROMER & CO., Brass and Iron Padlocks.</p> <p>H. B. IVES,
Ives Burglar-Proof Door-Bolts.</p> <p>CHALFANT MFG. CO.,
Polishing and Gas Toilet-Irons.</p> <p>RIPLEY MFG. CO.,
Bung-Starters, Mallets, &c.</p> <p>FRED. J. MYERS MFG. CO.,
Corn-Poppers, Fly-Traps and
Wire Goods.</p> <p>AMIDON & WHITE, Braces.</p> <p>CRONK HANGER CO.,
Larn-Door Hangers, Plyers, &c.</p> |
|--|---|

HOPKINS' HANDY NOTES AND QUERIES.

APPROXIMATE WEIGHTS OF STRAP AND T HINGES.

Weight per dozen. Furnished by Stanley Works.

HEAVY STRAP HINGES.

S. z.	4	5	6	8	10	12	14	16	ins.
Weight.	6¾	10½	19½	32¼	55¼	74¼	89¼	103½	lbs.

EXTRA HEAVY T HINGES.

Size.....	6	8	10	12	14	16	ins.
Weight	20¼	34 ¼	54	78	83¼	87¼	lbs.

STRAP AND T HINGES ARE COUNTERSUNK FOR SCREWS.

Inches	3	4	5	6	8	10	12	14	16	18
Light Strap..	Size Screws	6	7	8	9	10	10	12	13	13
Heavy Strap.....	"		9	9	11	12	14	16	16	16
Light T.....	"	7	7	8	8	9	10	11	12	
Heavy T.....	"				9	10	11	12	13	13
Extra Heavy T....	"			10	11	13	14	16	16	16
Hinge Hasps.....	"	6	7		9	10	10	12		

WROUGHT BUTTS—Countersunk for Screws.

TABLE BUTTS AND BACK FLAPS.

Inches	¾	1	1½	1¾	1¾	1½	1½	1¾	2½	2
Size Screw	6	6	7	7	7	5	8	9	9	9

NARROW WROUGHT BUTTS.

Inches..	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	5½	6
Screws..	5	6	7	7	8	8	9	9	10	12	12	12	12	14	14	14	14

LIGHT NARROW AND LIGHT LOOSE PIN.

Inch	¾	1	1¼	1½	1¾	2	2¼	2½	3
Screws.....	2	3	3	5	5	6	6	6	7

LOOSE PIN OR BROAD.

Size.....	2x2 to 2½x2	2½x2½ to 3x3	3x3½	3½x3 to 4½x4	4½x4½ to 5½	5x5 to 6x7
Screws.....	9	10	11	14	13	14

CAST BUTTS

ARE COUNTERSUNK FOR SCREWS AS FOLLOWS:

NARROW, FAST OR LOOSE JOINT.

Inch.....	1½	1¾	2	2¼	2½	3	3¼	3½	4	4½	5	6
Screws	6	7	7	8	8	8	10	10	10	12	14	12

PARLIAMENT.

Inch.....	2½ to 3½	3¾ and 4	4½ to 7½	8 and 8½
Screw ...	8	10	11	13

BROAD, FAST, AND LOOSE JOINT AND LOOSE PIN.

Inch.....	2x2 to 2½x3	3x2½ to 3½x3½	3½x4
Screw	8	10	11

Inch	3½x5	4x3	4x3½ to 4½x4½	4½x5 and upwards
Screw.....	10	10	11	13

CORRUGATED

✦ IRON ✦
ROOFING
 SIDING, CEILING,
 ARCHES AND LATH.
CINCINNATI
CORRUGATING CO.
 CINCINNATI, O.
 SEND FOR ILLUSTRATED CATALOGUE.

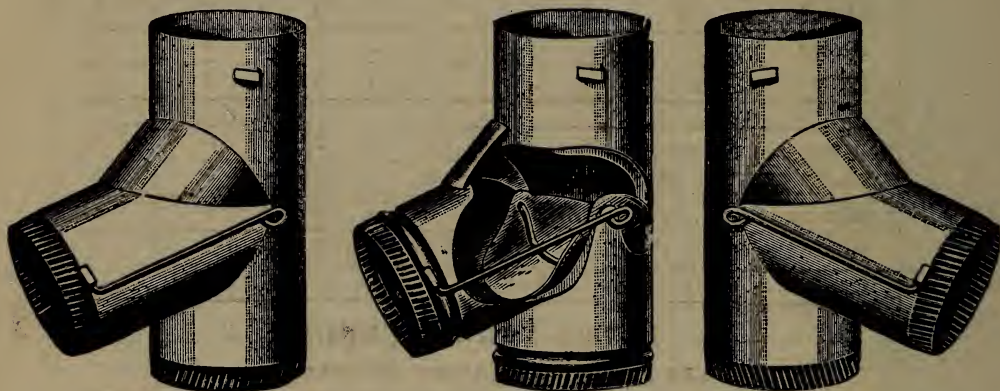
STANDING SEAM

THE CENTENNIAL RAIN-WATER CUT-OFF.

PATENTED APRIL 18, 1876.

“Success is the Measure of Merit.”

This cut-off has been on the market but three years, and to-day it is the favorite with the trade throughout the United States and Canada.



RIGHT-HAND WIRE.

SECTIONAL VIEW.

LEFT-HAND WIRE.

They are made in all sizes from two inches up, of TIN or GALVANIZED IRON. They are nicely japanned, and put up in crates of one dozen each (assorted—right and left-hand wires), so they may be used in any position without extra pipe or elbows.

The following are Regular Sizes Carried in Stock:

2 in. Tin.....	per doz.	\$4 00	3 in. Galvanized Iron, per doz.	\$8 00
3 in. Tin.....	"	5 00	4 " " " "	12 00
4 in. Tin.....	"	8 00	5 " " " "	16 00
5 in. Tin.....	"	13 00	6 " " " "	20 00
6 in. IX.....	"	18 00	7 " " " "	25 00
			8 " " " "	30 00

Ask your jobber for them, or write to the undersigned, who will give you manufacturer's prices. Manufactured by

W. P. MYER, 22, 24 and 26 E. SOUTH St., INDIANAPOLIS, Ind.

ASK US FOR PRICE ON A SAMPLE ORDER,

HOPKINS' HANDY NOTES AND QUERIES.

WROUGHT BRASS BUTTS.

Width when Open, and Sizes of Screws Required.

WIDTH OF BRASS BUTTS, WHEN OPEN.

Size.....Inches	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$
Narrow .....Width	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Middle	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1	1
Broad.....	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$
Desk.....	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{2}$

Size.....Inches	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	...
Narrow .....Width	1	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	...
Middle	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{8}$	...
Broad.....	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	..
Desk	$2\frac{3}{4}$	3	..	...	...	...	...	...	...

BRASS BUTTS ARE COUNTERSUNK FOR SCREWS AS FOLLOWS :

Size.....Inch	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$
Narrow....Size of Screw	0	1	1	2	2	3	4	4	4
Middle	0	1	1	2	2	3	4	4	4
Broad.....	0	1	1	2	2	3	4	4	4
Desk	1	2	2	4	4	4	4	5	5

Size.....Inch	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$
Narrow....Size of Screw	4	5	5	5	6	6	7	7	8
Middle	4	5	5	5	6	6	7	7	8
Broad.....	4	5	5	5	6	7	7	7	8
Desk	6	6	7	...	...	...	...	...	...

EMERY AND CORUNDUM

ARE BANKED OR GRADED AS FOLLOWS :

Nos.	8-10.....	Represents a	Wood rasp.
"	16-20.....	"	Rough file.
"	24-30.....	"	Middle cut file.
"	36-40.....	"	Bastard cut file.
"	46-60.....	"	Second cut file.
"	70-80.....	"	Smooth cut file.
"	90-100.....	"	Superfine cut file.
"	120-FFF.....	"	Dead smooth file.

Baeder & Adamson's Emery Paper and Cloth

COMPARE WITH GRADE AS FOLLOWS :

Nos.	000	00	0	100	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Emery....	Crocus	Flour	120	100	90	80	70	60	54	46

SPECIAL NOTICE TO THE TRADE.

EUREKA FIRE HOSE COMPANY,

13 BARCLAY STREET, New York.

MANUFACTURERS OF

SEAMLESS COTTON AND MILDEW-PROOF, RUBBER LINED
“EUREKA GARDEN HOSE”



This Company for the seasons trade in **GARDEN HOSE** invites the especial attention of dealers, and solicits their orders for our products of Hose for Household purposes. This hose is known as the **“EUREKA GARDEN HOSE,”** which we have greatly improved in appearance and weaving—unequalled by any and the very best Hose in the market.

Eureka Garden Hose sells on sight.

It is **Superior to the Best Rubber Hose** for durability and strength. It is mildew-proof and will stand over 500 lbs. pressure per square inch and outlast Rubber Hose many times over **EXPOSE IT TO DRY AFTER USE**, though it may be soaked every time it is used; having no outside covering to imprison the moisture, will, if given a fair chance, dry immediately, no gas is generated and the cotton is uninjured. This is a proven fact in fire departments, where our rubber lined Cotton Hose has been known to outlast all others many years.

After use **DO NOT REEL UP WET, BUT PUT THIS HOSE IN THE SUN AND AIR WHERE IT CAN DRY**, and it will last many years.

Once handled by the Trade, and used by the Consumer, it has given the highest satisfaction to both parties.

THE EUREKA GARDEN HOSE CANNOT BE INJURED BY EXPOSURE TO THE SUN, same as Rubber Hose.

—PRICE LIST.—

$\frac{1}{2}$ Inch	Eureka Garden Hose,	-	-	20 Cents per Foot.
$\frac{3}{4}$ “	“ “ “ “	-	-	25 “ “ “
1 “	“ “ “ “	-	-	35 “ “ “

“SEND FOR SAMPLES.”

*Subject to Liberal Discount to the Trade. Couplings attached and Pipes
Furnished when required.*

HOPKINS' HANDY NOTES AND QUERIES.

SPUN BRASS KETTLES,

WEIGHT AND CAPACITY OF.

7 in.....	1 lb.....	$\frac{1}{2}$ gal	18 in.....	$10\frac{1}{2}$ lb.....	10 gal
8 ".....	$1\frac{1}{2}$ ".....	1 "	19 ".....	$12\frac{1}{2}$ ".....	12 "
9 ".....	$2\frac{1}{2}$ ".....	$1\frac{1}{2}$ "	20 ".....	$16\frac{1}{2}$ ".....	14 "
10 ".....	3 ".....	2 "	21 ".....	18 ".....	17 "
11 ".....	$3\frac{1}{2}$ ".....	$2\frac{1}{2}$ "	22 ".....	20 ".....	18 "
12 ".....	4 ".....	3 "	23 ".....	23 ".....	23 "
13 ".....	5 ".....	4 "	24 ".....	$27\frac{1}{2}$ ".....	25 "
14 ".....	$5\frac{3}{4}$ ".....	$4\frac{1}{2}$ "	25 ".....	29 ".....	30 "
15 ".....	$6\frac{1}{2}$ ".....	5 "	26 ".....	32 ".....	32 "
16 ".....	$7\frac{1}{2}$ ".....	6 "	27 ".....	37 ".....	37 "
17 ".....	9 ".....	8 "	28 ".....	40 ".....	42 "

Number of Copper Belt Rivets and Burs in one Pound.

Inch....	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	Burs
No. 7....	272	250	228	180	164	160	148	112	116	100	84	80	69	345
" 8....	276	248	208	200	178	172	152	136	110	104	96			390
" 9....	340	280	272	248	228	220	184	176	156	136				610
" 10....	544	448	384	340	304	300	272	238	204					716
" 12....	588	512	452	404	354	334	304	272						985
" 13....	996	852	532											1630

Copper Hose Rivets and Burs.

Size.....	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	Burs.
No. 7....			155	142	133	122	109	97	345
" 8....	308	201	181	160	150	135	116	100	390

Copper Oval Head (or Trunk) Rivets and Burs.

	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	Burs
No. 9.....	320	285	259	243	219	199	177	159	137	123	113	104	610

Number of Copper Braziers' Rivets in one Pound.

Nos.....	0	1	2	3	4	5	6	7	8	9	10
	148	100	70	44	34	24	18	12	9	6	4

RAYMOND'S
COMPRESSED LEAD SASH WEIGHTS.

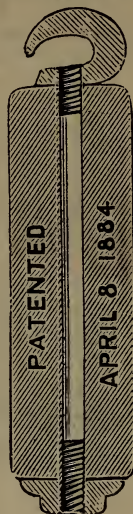
*With Wrought and Malleable-Iron Fastenings.
The only Lead Weight made with Secure Fastenings.*



SOLID.



COMPACT.



NOISELESS.



SMOOTH FINISH.

Twice the heft of Iron. Occupy only half the space. No friction. No noise. Each Weight centered, making it hang perfectly true and plumb. Endorsed by all the leading Architects and Builders. Prices no higher than the ordinary Cast Lead Weights.

Send for Circular. Orders filled at sight.

Raymond Lead Co., Lake and Clinton Sts.. Chicago, Ill.

Cambridge Roofing Company,



MANUFACTURERS OF

SUPERIOR Roofing and Siding,

Made of STEEL and
CHARCOAL IRON.

OUR SPECIALTY, CROWL'S PATENT Standing Seam,

WHICH TOOK FIRST MEDAL AT NEW ORLEANS EXPOSITION.

Corrugated Roofing and Siding,
Crimped-Edge Roofing and Siding.

Send for Catalogue and Price-List.

CAMBRIDGE, OHIO.

HOPKINS' HANDY NOTES AND QUERIES.

BUILDERS' REFERENCE TABLES.

Size of Class in Windows.			Size of Sash and Frame.	Weights.	
12 Lights.	8 Lights.	4 Lights.		1 1/4	1 1/2
8x10	12 x10	12 x20	2.4 x3.10	LBS. 4	LBS. 5
8x12	12 x12	12 x24	2.4 x4.6	4 1/2	5
9x12	13 1/2 x12	13 1/2 x24	2.7 x4.6	5	5 1/2
9x13	13 1/2 x13	13 1/2 x26	2.7 x4.10	5 1/2	5 1/2
9x14	13 1/2 x14	13 1/2 x28	2.7 x5.2	5 1/2	6
9x15	13 1/2 x15	13 1/2 x30	2.7 x5.6	5 1/2	6 1/2
9x16	13 1/2 x16	13 1/2 x32	2.7 x5.10	6	6 1/2
10x12	15 x12	15 x24	2.10x4.6	5 1/2	6
10x14	15 x14	15 x28	2.10x5.2	6	6 1/2
10x15	15 x15	15 x30	2.10x5.6	6	7
10x16	15 x16	15 x32	2.10x5.10	6 1/2	7 1/2
10x18	15 x18	15 x36	2.10x6.6	7	8
10x20	15 x20	15 x40	2.10x7.2	8	9
11x14	16 1/2 x14	16 1/2 x28	3.1 x5.2	6	7
11x15	16 1/2 x15	16 1/2 x30	3.1 x5.6	6 1/2	7 1/2
11x16	16 1/2 x16	16 1/2 x32	3.1 x5.10	7	8
11x17	16 1/2 x17	16 1/2 x34	3.1 x6.2	7	8
11x18	16 1/2 x18	16 1/2 x36	3.1 x6.6	7 1/2	8 1/2
12x14	18 x14	18 x28	3.4 x5.2	6 1/2	7 1/2
12x15	18 x15	18 x30	3.4 x5.6	7	8
12x16	18 x16	18 x32	3.4 x5.10	7 1/2	8 1/2
12x18	18 x18	18 x36	3.4 x6.6		9 1/2
12x20	18 x20	18 x40	3.4 x7.2		10 1/2
12x24	18 x24	18 x48	3.4 x8.6		12

One Hank of Sash Cord will hang 16 Weights. Each Hank Measures 75 feet and weighs about 2 1-4 lbs.

SOLID EYE SASH WEIGHTS.

Length and Thickness of Each Size.

Weight.	Inches in Diam.	Length.	Weight.	Inches in Diam.	Length.	Weight.	Inches in Diam.	Length.
2	1 1/2	5 3/4	9	1 5/8	18 1/2	18	2	23 7/8
2 1/2	1 1/2	6 1/2	9 1/2	1 5/8	18 3/4	19	2	24 1/4
3	1 1/2	7 1/4	10	1 3/4	18	20	2	25 3/8
3 1/2	1 1/2	9 1/4	10 1/2	1 3/4	18 1/4	21	2	27 1/4
4	1 1/2	10 3/4	11	1 3/4	19 1/4	22	2	27 3/4
4 1/2	1 1/2	11 1/4	11 1/2	1 3/4	20 9/16	23	2	29 3/4
5	1 1/2	12 1/2	12	1 1/2	18 1/2	24	2	31 1/4
5 1/2	1 1/2	13 1/2	12 1/2	1 1/2	19 1/2	25	2	32 1/4
6	1 1/2	14 3/4	13	2	17 1/2	26	2	32 7/8
6 1/2	1 1/2	16 3/8	14	2	19 3/8	27	2	34 1/2
7	1 1/2	17	15	2	20 1/4	28	2	36 3/4
7 1/2	1 1/2	18 1/4	16	2	21 1/4	29	2	38 1/4
8	1 1/2	16 3/4	17	2	22 1/2	30	2	39 1/2
8 1/2	1 1/2	17 1/2						

AMERICAN BOLT AND SCREW CASE CO.,

Manufacturers of Patent Revolving Bolt and Screw Cases,
DAYTON, OHIO.

BOLT CASE.



ROOFING SLATE.

GENERAL RULE FOR THE COMPUTATION OF SLATE.

From the length of the slate take three inches, or as many as the third covers the first; divide the remainder by 2, and multiply the quotient by the width of the slate, and the product will be the number of square inches in a single slate. Divide the number of square inches thus procured by 144, the number of square inches in a square foot, and the quotient will be the number of feet and inches required. A square of slate is what will cover 100 feet square, when properly laid upon the roof.

TABLE OF SIZES AND NUMBER OF SLATES IN ONE SQUARE.

Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.
6x12	533	9x14	291	10x18	192	11x22	137
7x12	457	10x14	261	11x18	174	12x22	126
8x12	400	12x14	218	12x18	160	14x22	108
9x12	355	8x16	277	14x18	137	12x24	114
10x12	320	9x16	246	10x20	169	14x24	98
12x12	266	10x16	221	11x20	154	16x24	86
7x14	374	12x16	185	12x20	141	14x26	89
8x14	327	9x18	213	14x20	121	16x26	78

The weight of a square of Slate is estimated in a general way (varying according to the thickness of the different makes) at from 600 to 700 lbs. per square.

A *square* of Slate is 100 superficial feet.

Gauge is distance between the courses of the slates.

Lap is distance which each slate overlaps the slate lengthwise next but one below it, and it varies from 2 to 4 inches. The standard is assumed to be 3 inches.

Margin is width of course exposed or distance between tails of slate.

Pitch of a slate roof should not be less than 1 in height to 4 in breadth.

Length of a slate is taken from nail-hole to tail.

Thickness of slates ranges from $\frac{1}{8}$ to $\frac{5}{16}$ inch.

WEIGHT PER SQUARE FOOT.

Thickness.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
Weight	1.81	2.71	3.62	5.43	7.25	9.06	10.87	14.5 lbs.

Weight per cubic foot, 174 pounds.

It requires, on account of laps, an average of nearly $2\frac{1}{2}$ square feet of slate to make one of slating.

WINDOW GLASS.



IMPORTERS —

ENGLISH and FRENCH PLATE GLASS,
FRENCH WINDOW GLASS.

FRENCH PICTURE GLASS.

ENAMELED GLASS, FRENCH CAR GLASS.

GROUND GLASS,

CATHEDRAL GLASS.

RUBY, BLUE, GREEN, ORANGE and PURPLE GLASS.

SHARRATT & NEWTH'S ENGLISH GLAZIERS' DIAMONDS.

—ALSO—

American Plate Glass. American Window Glass.
Floor and Skylight Glass. Embossed and Cut Glass.

All kinds of Glass Cut to any Size and Shape required. Estimates furnished.

HOLBROOK BROTHERS,

87 & 89 Beekman, and 53 & 55 Cliff Streets,
NEW YORK CITY.

HOPKINS' HANDY NOTES AND QUERIES.

WINDOW GLASS.

FRENCH OR AMERICAN.

NO. OF LIGHTS PER BOX OF 50 FEET.

6	by 8	150	13	by 20	28	16	by 54	8	24	by 30	10	3	by 36	6
6½	" 8½	130	13	" 22	25	16	" 60	8	24	" 32	10	32	" 38	6
7	" 9	115	13	" 24	23	18	" 20	20	24	" 34	9	32	" 40	6
8	" 10	90	13	" 26	21	18	" 20	18	24	" 36	9	32	" 42	6
8½	" 10½	81	13	" 28	20	18	" 24	17	24	" 38	8	32	" 44	5
8	" 11	82	13	" 30	19	18	" 26	16	24	" 40	8	32	" 48	5
8	" 12	75	13	" 32	17	18	" 28	14	24	" 42	7	32	" 50	5
9	" 11	73	14	" 15	34	18	" 30	14	24	" 46	7	32	" 56	4
9	" 12	67	14	" 16	32	18	" 32	13	24	" 48	6	32	" 60	4
9	" 13	62	14	" 17	31	18	" 34	12	24	" 50	6	32	" 66	3
9	" 14	57	14	" 18	29	18	" 36	11	24	" 54	6	34	" 36	6
9	" 15	53	14	" 20	26	18	" 38	11	24	" 56	5	34	" 40	6
9	" 16	50	14	" 22	24	18	" 40	10	24	" 60	5	34	" 44	5
9	" 18	45	14	" 24	22	18	" 42	10	24	" 66	5	34	" 46	5
10	" 12	60	14	" 26	20	18	" 44	9	26	" 23	10	34	" 48	5
10	" 13	55	14	" 28	19	18	" 46	9	26	" 30	9	34	" 50	4
10	" 14	52	14	" 30	17	18	" 50	8	26	" 32	9	34	" 54	4
10	" 15	48	14	" 32	16	18	" 52	8	26	" 34	8	34	" 56	4
10	" 16	45	14	" 34	15	18	" 56	7	26	" 36	8	34	" 60	4
10	" 17	43	14	" 36	14	18	" 60	7	26	" 38	7	34	" 66	3
10	" 18	40	14	" 38	14	20	" 22	16	26	" 42	7	36	" 40	5
10	" 20	36	14	" 40	13	20	" 24	15	26	" 44	6	36	" 44	5
10	" 22	33	14	" 42	12	20	" 26	14	26	" 48	6	36	" 48	4
10	" 24	30	14	" 44	12	20	" 28	13	26	" 50	6	36	" 48	4
10	" 26	28	14	" 46	11	20	" 30	12	26	" 52	5	36	" 50	4
10	" 28	26	15	" 16	30	20	" 32	11	26	" 54	5	36	" 54	4
10	" 30	24	15	" 18	27	20	" 34	11	26	" 58	5	36	" 56	4
11	" 12	55	15	" 20	24	20	" 36	10	26	" 60	5	36	" 60	3
11	" 13	51	15	" 22	22	20	" 38	10	28	" 30	9	36	" 64	3
11	" 14	47	15	" 24	20	20	" 40	9	28	" 32	8	36	" 66	3
11	" 15	44	15	" 26	19	20	" 42	9	28	" 34	8	36	" 70	3
11	" 16	41	15	" 28	17	20	" 44	8	28	" 36	7	38	" 40	5
11	" 17	39	15	" 30	16	20	" 48	8	28	" 40	7	38	" 42	5
11	" 18	37	15	" 32	15	20	" 50	7	28	" 42	6	38	" 44	4
11	" 20	33	15	" 34	14	20	" 54	7	28	" 46	6	38	" 52	4
11	" 22	30	15	" 36	13	20	" 58	6	28	" 50	5	38	" 56	3
11	" 24	27	15	" 38	13	20	" 64	6	28	" 56	5	38	" 62	3
12	" 13	46	15	" 40	12	22	" 24	14	28	" 60	4	38	" 66	3
12	" 14	43	16	" 16	28	22	" 26	13	28	" 66	4	40	" 40	4
12	" 15	40	16	" 18	25	22	" 28	12	30	" 30	8	40	" 42	4
12	" 16	38	16	" 20	23	22	" 30	11	30	" 32	8	40	" 44	4
12	" 17	35	16	" 22	21	22	" 32	10	30	" 34	7	40	" 50	4
12	" 18	34	16	" 24	19	22	" 34	10	30	" 38	7	40	" 54	3
12	" 20	30	16	" 26	17	22	" 36	9	30	" 40	6	40	" 60	3
12	" 22	27	16	" 28	16	22	" 38	9	30	" 44	6	40	" 66	3
12	" 24	25	16	" 30	15	22	" 40	8	30	" 46	5	40	" 72	3
12	" 26	23	16	" 32	14	22	" 42	8	30	" 48	5	42	" 42	4
12	" 28	22	16	" 34	13	22	" 44	7	30	" 50	5	42	" 48	4
12	" 30	20	16	" 36	13	22	" 48	7	30	" 52	5	42	" 52	3
12	" 32	19	16	" 38	12	22	" 50	7	30	" 54	4	42	" 62	3
12	" 34	18	16	" 40	11	22	" 52	6	30	" 56	4	42	" 68	3
12	" 36	17	16	" 42	11	22	" 56	6	30	" 60	4	44	" 46	4
13	" 14	40	16	" 44	10	22	" 60	5	30	" 64	4	44	" 50	3
13	" 15	37	16	" 46	10	24	" 24	12	30	" 66	4	44	" 56	3
13	" 16	35	16	" 48	9	24	" 26	12	30	" 70	3	46	" 54	3
13	" 18	31	16	" 52	9	24	" 28	11	32	" 34	7	46	" 64	3

BRUCE & COOK,

—IMPORTERS OF—

METALS.

TIN PLATE.

Roofing Plate,
Special Sizes,
Block & Bar Tin,
Tinnerns' Solder.

SHEET IRON.

Russia,
Pat. Planished,
Galvanized,
Double Seaming,
Cold Rolled,
Common.

WIRE.

Bright Iron,
Annealed Fence,
Coppered,
Galvanized,
Tinned.

SOLDER.

Ex. Wiping,
No. 1 Refined,
No. 1 Capping,
Ex. No. 1 "B. & C."
Half and Half.

COPPER.

Sheet, Bottoms,
Solderns, Bolts,
Wire, Ingot.

SHEET ZINC.

American,
Spelter.

ELBOWS.

Russia, Planished
Charcoal.

Stove Boards.

Stove Bolts,
" Pipe Collars,
" "Dampers,

Fire Pots,
Rivets, Black,
" Tinned,
Kettle Ears.

SUNDRIES.

Babbitt Metal,
Antimony,
Spelter Solder,
Tinsmiths' Tools
and Machines,
Milk Can Trim-
mings.



**AUSTIN'S PATENT EXPANDING CONDUCTOR, AND SPIRAL RIBBED PIPE.
PATENT ROOFING SEAMER FOR PUTTING TIN TOGETHER.**

All Latest and Best Machines for Roofers and Tinnerns.

We call special notice to our Retail Department for those wanting Tinm n's Supplies less than full packages. All orders promptly attended to. Write for prices.

HOPKINS' HANDY NOTES AND QUERIES.

Table of Standard or Regular Tin Plates.

Size and Kind of Plates—Number and Weight of Sheets in a Box, and Wire Gauge Thickness, of every Kind and Size.

Size.	Grade.	Sheets in Box.	Pounds in Box.	Wire Gauge.	Size.	Grade.	Sheets in box.	Pounds in box.	Wire Gauge.
10 by 10	IC	225	78	29	13 by 13	IC	225	130	29
"	IX	225	98	27	"	IX	225	164	27
"	IXX	225	112	26	"	IXX	225	190	26
"	IXXX	225	124	25	"	IXXX	225	216	25
"	IXXXX	225	140	24½	14 by 14	IC	225	152	29
10 by 14	IC	225	108	29	"	IX	225	192	27
"	IX	225	136	27	"	IXX	225	221	26
"	IXX	225	159	26	"	IXXX	225	250	25
"	IXXX	225	178	25	"	IXXXX	225	279	24½
"	IXXXX	225	200	24½	15 by 15	IX	225	221	27
10 by 20	IC	225	156	29	"	IXX	225	255	26
"	IX	225	196	27	"	IXXX	225	288	25
11 by 11	IC	225	95	29	"	IXXXX	225	322	24½
"	IX	225	118	27	16 by 16	IC	225	200	29
"	IXX	225	135	26	"	IX	225	252	27
11 by 15	SDC	200	164	26	"	IXX	225	290	26
"	SDX	200	185	25	"	IXXX	225	328	25
"	SDXX	200	206	24½	"	IXXXX	225	368	24½
"	SDXXX	200	226	24	17 by 17	IX	112	140	27
"	SDXXXX	200	248	23	"	IXX	112	162	26
22 by 15	SDC	100	164	26	"	IXXX	112	184	25
"	SDX	100	185	25	"	IXXXX	112	205	24½
"	SDXX	100	206	24½	18 by 18	IX	112	153	27
"	SDXXX	100	226	24	"	IXX	112	182	26
"	SDXXXX	100	248	23	"	IXXX	112	206	25
12½ by 17	DC	100	96	23	"	IXXXX	112	231	24½
"	DX	100	124	26	22 by 22	IXX	56	135	26
"	DXX	100	145	24	"	IXXX	56	...	25
"	DXXX	100	166	23	"	IXXXX	56	...	24½
"	DXXXX	100	185	22	24 by 24	IXX	56	157	26
15 by 21	DX	100	183	27	"	IXXX	56	...	25
"	DXX	100	214	24	"	IXXXX	56	...	24½
"	DXXX	100	243	23	TERNE PLATES.				
"	DXXXX	100	276	22	14 by 20	IC	112	108	29
25 by 17	DC	50	96	23	"	IX	112	136	27
"	DX	50	124	26	20 by 23	IC	112	216	29
"	DXX	50	145	24	"	IX	112	272	27
"	DXXX	50	166	23	20 by 200	IC	....	172	29
"	DXXXX	50	185	22	"	IX	....	216	27
14 by 20	IC	112	108	29	TIN TAGGERS.				
"	IX	112	136	27	10 by 14	| 450 | 108 | 33			
"	IXX	112	157	26	BLACK TAGGERS.				
"	IXXX	112	178	25	10 by 14	| 256 | 108 | 32			
"	IXXXX	112	200	24½	"	| 300 | 108 | 34			
"	IXXXXXX	112	240	23½	"	| 360 | 108 | 36			
12 by 12	IC	225	108	29	"	| 450 | 108 | 38			
"	IX	225	136	27					
"	IXX	225	157	26					
"	IXXX	225	178	25					

HOPKINS' HANDY NOTES AND QUERIES.

From the "Metal Worker."

Cost of Tin Roofing.

The following table shows the cost per square and per square foot of tin roofing, laid with 14x20 tin, with tin at any price from \$4 to \$10 per box. The first column contains the price per box of tin; the second column shows the cost of tin per square (100 square feet) of surface, and the third column shows the cost of tin per square foot of surface:

FLAT SEAM ROOFING—COST WITH 14x20 TIN.

Price of tin per box.	Cost per square of flat roof 14x20 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of flat roof 14x20 tin.	Cost per sq. foot.
\$4.25.....	\$2.21.....	.0221	\$8.25.....	\$4.29.....	.0429
4.50.....	2.34.....	.0234	8.50.....	4.42.....	.0442
4.75.....	2.47.....	.0247	8.75.....	4.55.....	.0455
5.00.....	2.60.....	.0260	9.00.....	4.68.....	.0468
5.25.....	2.73.....	.0273	9.25.....	4.81.....	.0481
5.50.....	2.86.....	.0286	9.50.....	4.94.....	.0494
5.75.....	2.99.....	.0299	9.75.....	5.07.....	.0507
6.00.....	3.12.....	.0312	10.00.....	5.20.....	.0520
6.25.....	3.25.....	.0325	10.25.....	5.33.....	.0533
6.50.....	3.38.....	.0338	10.50.....	5.46.....	.0546
6.75.....	3.51.....	.0351	10.75.....	5.59.....	.0559
7.00.....	3.64.....	.0364	11.00.....	5.72.....	.0572
7.25.....	3.77.....	.0377	11.25.....	5.85.....	.0585
7.50.....	3.90.....	.0390	11.50.....	5.98.....	.0598
7.75.....	4.03.....	.0403	11.75.....	6.11.....	.0611
8.00.....	4.16.....	.0416	12.00.....	6.24.....	.0624

STANDING SEAM ROOFING—COST WITH 14x20 TIN.

Price of tin per box.	Cost per square of standing seam roof with 14x20 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of standing seam roof with 14x20 tin.	Cost per sq. foot.
\$4.25.....	\$2.37.....	.0237	\$7.25.....	\$4.03.....	.0403
4.50.....	2.51.....	.0251	7.50.....	4.17.....	.0417
4.75.....	2.65.....	.0265	7.75.....	4.31.....	.0431
5.00.....	2.79.....	.0279	8.00.....	4.45.....	.0445
5.25.....	2.93.....	.0293	8.25.....	4.59.....	.0459
5.50.....	3.06.....	.0306	8.50.....	4.73.....	.0473
5.75.....	3.20.....	.0320	8.75.....	4.87.....	.0487
6.00.....	3.34.....	.0334	9.00.....	5.01.....	.0501
6.25.....	3.48.....	.0348	9.25.....	5.15.....	.0515
6.50.....	3.62.....	.0362	9.50.....	5.29.....	.0529
6.75.....	3.76.....	.0376	9.75.....	5.43.....	.0543
7.00.....	3.90.....	.0390	10.00.....	5.57.....	.0557

HOPKINS' HANDY NOTES AND QUERIES.

Cost of Tin Roofing—Continued.

The following table shows the cost per square and per square foot of tin roofing, laid with 20x28 tin, with tin at any price from \$8 to \$24 per box. The first column contains the price per box of tin; the second column shows the cost of tin per square (100 square feet) of surface, and the third column shows the cost of tin per square foot of surface.

FLAT SEAM ROOFING—COST WITH 20x28 TIN.

Price of tin per box.	Cost per square of flat seam roof 20x28 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of flat seam roof 20x28 tin.	Cost per sq. foot.
\$8.00.....	\$2.01.....	.0201	\$16.00	\$4.01 ....	.0401
8.50.....	2.13.....	.0213	16.50.....	4.13.....	.0413
9.00.....	2.26.....	.0226	17.00.....	4.26.....	.0426
9.50.....	2.38.....	.0238	17.50.....	4.38.....	.0438
10.00.....	2.51.....	.0251	18.00.....	4.51.....	.0451
10.50.....	2.63.....	.0263	18.50.....	4.63.....	.0463
11.00.....	2.76.....	.0276	19.00.....	4.76.....	.0476
11.50.....	2.88.....	.0288	19.50.....	4.88.....	.0488
12.00.....	3.00.....	.0300	20.00.....	5.01.....	.0501
12.50.....	3.13.....	.0313	20.50.....	5.13.....	.0513
13.00.....	3.25.....	.0325	21.00.....	5.26.....	.0526
13.50.....	3.38.....	.0338	21.50.....	5.38.....	.0538
14.00.....	3.50.....	.0350	22.00.....	5.51.....	.0551
14.50.....	3.63.....	.0363	22.50.....	5.63.....	.0563
15.00.....	3.75.....	.0375	23.00.....	5.76.....	.0576
15.50.....	3.88.....	.0388			

STANDING SEAM ROOFING—COST WITH 20x28 TIN.

Price of tin per box.	Cost per square of standing seam roof with 20x28 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of standing seam roof with 20x28 tin.	Cost per sq. foot.
\$8.00.....	\$2.15.....	.0215	\$16.50.....	\$4.42.....	.0442
8.50.....	2.28.....	.0228	17.00.....	4.56.....	.0456
9.00.....	2.41.....	.0241	17.50.....	4.69.....	.0469
9.50.....	2.55.....	.0255	18.00.....	4.82.....	.0482
10.00.....	2.68.....	.0268	18.50.....	4.96.....	.0496
10.50.....	2.82.....	.0282	19.00.....	5.09.....	.0509
11.00.....	2.95.....	.0295	19.50.....	5.23.....	.0523
11.50.....	3.09.....	.0309	20.00.....	5.36.....	.0536
12.00.....	3.21.....	.0321	20.50.....	5.49.....	.0549
12.50.....	3.35.....	.0335	21.00.....	5.63.....	.0563
13.00.....	3.48.....	.0348	21.50.....	5.76.....	.0576
13.50.....	3.62.....	.0362	22.00.....	5.90.....	.0590
14.00.....	3.75.....	.0375	22.50.....	6.03.....	.0603
14.50.....	3.89.....	.0389	23.00.....	6.17.....	.0617
15.00.....	4.02.....	.0402	23.50.....	6.30.....	.0630
15.50.....	4.15.....	.0415	24.00.....	6.43.....	.0643
16.00.....	4.29.....	.0429			

THE CARVER'S FRIEND.



SOLID EMERY KNIFE-SHARPENER.

Acknowledged by everyone to be

The Very Best Article of its Kind in Use To-Day.

A FEW STROKES WILL GIVE THE DULLEST KNIFE A KEEN EDGE,
WHICH EVERY HOUSEKEEPER WILL APPRECIATE.

HANDY FOR THE TABLE OR KITCHEN USE.

Made of the Best Turkish Emery, with a steel wire in the centre, and will LAST
FOR YEARS.

The Discount to the Trade is LIBERAL.

Sample sent on receipt of price.

For a Fine Cocobola Handle, 85c.; or with Applewood Handle, 60c.

For sale by Jobbers generally throughout the United States. Mention this Book.

W. H. PARKIN,

11 South Water Street, - CLEVELAND, O.

COULD & EBERHARDT,

Newark, N. J.

First-Class Machine Tools.

Patent SHAPERS,

Over 1000 in Use!

EBERHARDT'S PATENT

DRILLS

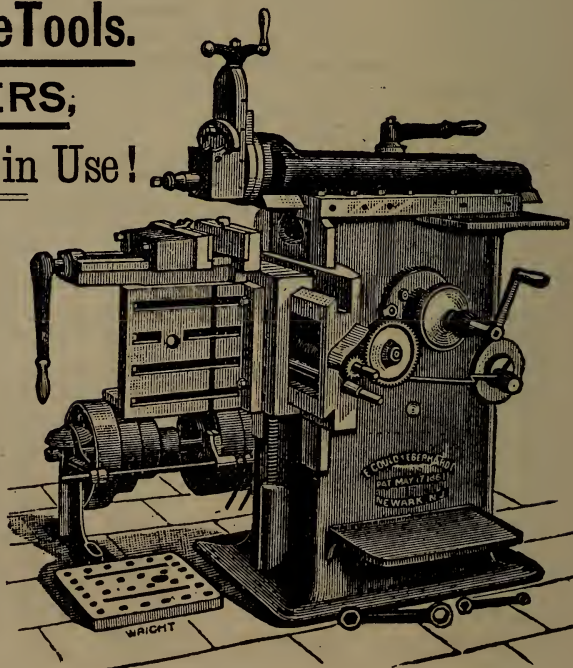
Experts Pronounce them the
BEST.

Automatic GEAR-CUTTERS

Automatic RACK-CUTTERS

Automatic DIAL-PRESSES

TOOL-GRINDERS, PLANERS,
LATHES.



HOPKINS' HANDY NOTES AND QUERIES.

RECIPES FOR SOLDERS.

SOFT SOLDERS.

Among the soft solders to be employed with metals melting at a low temperature, we give the following:

Solder for bright tin ware, etc.: "Half & Half."

Tin 50 parts.

Lead 50 "

Solder for roofing, and plumbing joints: "No. 1."

Tin 40 parts.

Lead 60 "

Solder for galvanized ware, etc.: "No. 1. Extra."

Tin 45 parts.

Lead 55 "

Solder for pewter:

Tin 100 parts.

Lead 200 "

Solder for sealing iron in stone:

Lead 200 parts.

Zinc 100 "

This alloy is more resisting and adheres better than pure lead.

Solders for obtaining casts of medals, coins, etc.:

Bismuth 400 or 600

Lead 200 " 200

Tin 200 " 300

This alloy melts between 212 F. (or at water-boiling point) and becomes very liquid.

HARD SOLDERS.

Above we give the alloys of all soft solders. Herewith we give the constituents and process of making the harder ones:

Solder for iron:

Copper 67

Zinc 33

Solder for pure copper or ordinary brass:

Copper 3

Zinc 1

Solder for hard brass:

Scraps of metal to be soldered 4

Zinc 1

Hard solder for small and thin pieces:

Copper 86.5

Zinc 4.5

Solder for uniting brass tube seams:

Copper... 70 } Brass 77.5

Tin..... 30 } Zinc 22.5

The proper process of making these solders is as follows: The copper and zinc are melted in separate crucibles, then added together in a pouring-pot and thoroughly mixed, and when at the proper temperature is poured from a certain height upon a bundle of birch twigs, kept wet and agitated at the surface of a tub of water. The solder is thus obtained in the shape of fine grains, having an irregular crystallization. When solder is not sufficiently fine it is hammered in a cast-iron mortar and passed through a sieve.

STOVE BOARDS.

The THREE BEST that can be Made.

Wood-Lined and Paper-Lined.

THE "DAISY"

IS MADE OF EMBOSSED WHITE METAL,
PERFECT IN MAKE AND FINISH,
BEAUTIFUL AND DURABLE.

THE "NEW TACOMA"

IS AN EMBOSSED METAL BOARD,
FIRE-PROOF AND BRASS-FINISHED.

THE "FAVORITE"

Is the Best ZINC Board Made.

Oil-Finished and a Durable Silver Polish.

Prices Reasonable. Send for Price-Lists and Discounts.

Sold by Jobbers in all of the Large Towns.

MADE ONLY BY

A. I. GRIGGS,

211 WATER STREET,

NEW YORK.

P. S.—He makes a metal "Slop-Jar Mat" that should
be under every slop-jar now in use.

HOPKINS' HANDY NOTES AND QUERIES.

Table of Weights of Sheet Copper per Square Foot, and Thickness per English Wire Gauge.

English Wire Gauge.	Weight per square foot.		Weight of each sheet.				
			14x48	24x48	30x60	26x72	48x72
No.	lbs.	oz.	lbs.	lbs.	lbs.	lbs.	lbs.
1	14	8	.....	116	181	261	348
2	13	14	.....	111	174	250	334
3	12	12	.....	102	159	230	306
4	11	9	.....	93	145	209	278
5	10	1	.....	81	126	182	242
6	9	6	.....	75	118	169	226
7	8	11	.....	70	109	157	209
8	7	14	.....	63	99	142	190
9	7	3	.....	58	90	130	173
10	6	8	.....	48	81	117	156
11	5	12	.....	46	73	104	139
12	5	1	.....	41	64	91	122
13	4	5	.....	35	54	78	104
14	3	9	.....	29	45	65	86
15	3	4	.....	26	41	59	78
16	2	14	.....	23	36	52	70
17	2	8	.....	20	32	45	60
18	2	2	.....	18	27	39	52
19	1	15	.....	16	24	35	47
20	1	12	.....	14	22	32	43
21	1	9	.....	13	20	29	39
22		22	6 $\frac{1}{2}$	12	18	26	35
23		20	5 $\frac{7}{8}$	10	16	23	31
24		18	5 $\frac{1}{2}$	9	15	21	28
25		16	4 $\frac{5}{8}$	8	12 $\frac{1}{2}$	19	25
26		14	4	7	11	15	21
27		12	3 $\frac{1}{2}$	6	9 $\frac{3}{8}$	13	18
28		10	3	5	7	11	15

Stubbs' Wire Gauge in Inches.

No. 1.....	5-16 in.	No. 11.....	1-8 in.
" 3.....	1-4 "	" 16.....	1-16 "
" 7.....	3-16 "	" 21.....	1-32 "

Rules to be Observed in Ordering Metal or Wire.

All Metal is numbered according to Brown & Sharpe's U. S. Standard Gauge, which is known as "The New Gauge."

All Wire is numbered according to Stubbs' English Wire Gauge, which is known as one of the "Old Gauges," to No. 25 inclusive; No. 26 and finer by London Gauge.

Parties ordering Metal or Wire will please make their orders to conform to above Gauges. All orders where the name of Gauge is not stated, will be filled as above. In case parties ordering Metal or Wire have no Gauge, a small piece of either material may be sent, which will answer for the Number.

For difference in Gauges see comparative table

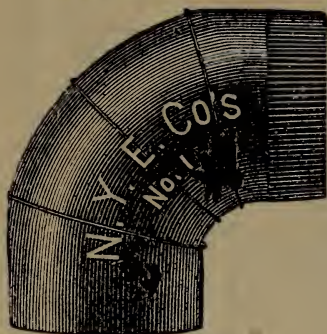
In ordering Metal always state width and temper wanted.

In ordering Wire always state whether Hard, Soft or Spring Wire is wanted.

The term "High" Brass refers to color, and not to temper.

The Trade's Favorite Still Ahead!

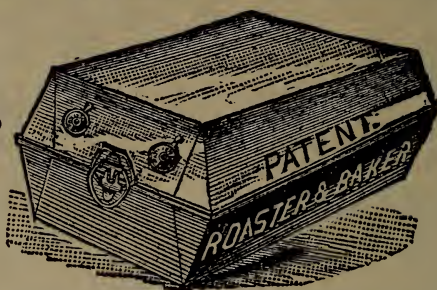
THE NEW YORK ELBOW COMPANY,



MANUFACTURERS OF

SHEET METAL ELBOWS

AND



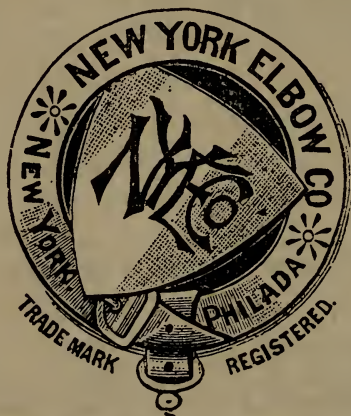
THE EMPIRE ROASTER AND BAKER,

18 Cliff St., New York.

117 N. 2d ST. PHILADELPHIA.

The name and reputation which has been attained by *Our Superior Make of Goods* is owing to the fact that we are the only manufacturers who have made Elbows exclusively from Best Refined and Russia Iron.

All ELBOWS of
Our Manufacture



Bear Red Label. "None Genuine Without It."

They are recognized by the trade as being the *Leading* and only *Standard Elbows* in the market. Beware of worthless imitations made from thin Boiled Iron and with loose, flimsy joints.

Send for Price-List and Sample Dozen.

ASK YOUR JOBBER FOR
NEW YORK ELBOW COMPANY'S ELBOWS.

HOPKINS' HANDY NOTES AND QUERIES.

Bar and Sheet Brass.

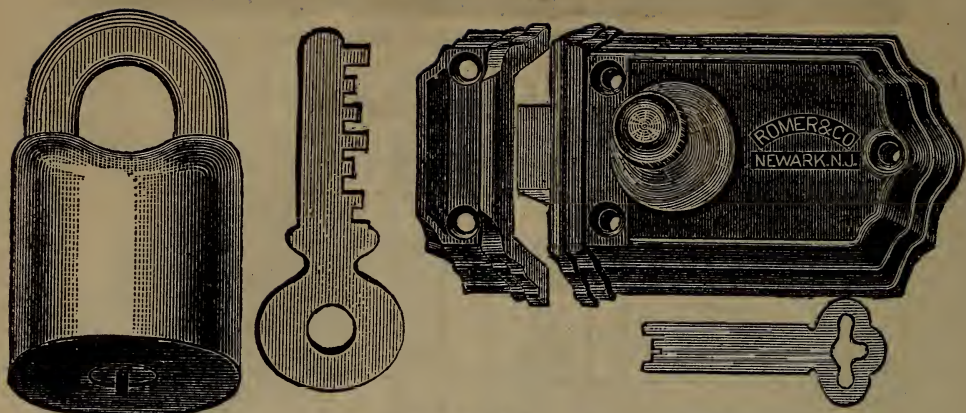
WEIGHT IN POUNDS.

Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	2.7	.015	.011	1 1-16	45.95	4.07	3.20
$\frac{1}{8}$	5.41	.055	.045	$\frac{1}{8}$	49.69	4.55	3.57
3-16	8.12	.125	.1	3-16	51.4	5.08	3.97
$\frac{1}{4}$	10.76	.225	.175	$\frac{1}{4}$	54.18	5.65	4.41
5-16	13.47	.350	.275	5-16	56.85	6.22	4.86
$\frac{3}{8}$	16.23	.51	.395	$\frac{3}{8}$	59.55	6.31	5.35
7-16	19.	.69	.54	7-16	62.25	7.45	5.85
$\frac{1}{2}$	21.65	.905	.71	$\frac{1}{2}$	65.	8.13	6.37
9-16	24.3	1.15	.9	9-16	57.75	8.83	6.92
$\frac{5}{8}$	27.12	1.4	1.1	$\frac{5}{8}$	70.35	9.55	7.48
11-16	29.77	1.72	1.35	11-16	73.	10.27	8.05
$\frac{3}{4}$	32.46	2.05	1.60	$\frac{3}{4}$	75.86	11.	8.65
13-16	35.18	2.4	1.85	13-16	78.52	11.82	9.29
$\frac{7}{8}$	37.85	2.75	2.15	$\frac{7}{8}$	71.25	12.68	9.95
15-16	40.55	3.15	2.48	15-16	84.	13.5	10.58
1	43.29	3.65	2.85	2	86.75	14.35	11.25

Bar and Sheet Copper.

Weight in Pounds.

Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	2.83	.015	.011	1 1-16	49.	4.35	3.41
$\frac{1}{8}$	5.75	.06	.056	$\frac{1}{8}$	52.	4.83	3.85
3-16	8.65	.134	.105	3-16	54.9	5.40	4.29
$\frac{1}{4}$	11.48	.235	.187	$\frac{1}{4}$	57.65	6.	4.73
5-16	14.36	.375	.295	5-16	60.5	6.60	5.20
$\frac{3}{8}$	17.28	.54	.424	$\frac{3}{8}$	53.45	7.27	5.70
7-16	20.19	.735	.575	7-16	66.35	7.90	6.28
$\frac{1}{2}$	23.1	.960	.75	$\frac{1}{2}$	69.3	8.64	6.80
9-16	26.	1.21	.95	9-16	72.15	9.23	7.30
$\frac{5}{8}$	28.85	1.51	1.17	$\frac{5}{8}$	75.1	10.15	8.
11-16	31.68	1.81	1.42	11-16	77.95	10.95	8.6
$\frac{3}{4}$	34.67	2.15	1.7	$\frac{3}{4}$	80.75	11.70	9.24
13-16	36.46	2.54	2.	13-16	83.60	12.60	9.85
$\frac{7}{8}$	40.39	2.95	2.3	$\frac{7}{8}$	86.58	13.46	10.55
15-16	43.27	3.37	2.64	15-16	89.45	14.35	11.25
1	46.15	3.84	3.01	2	92.25	15.35	12.



ROMER & CO.,

Manufacturers of

Patent Jail Locks,

Brass and Iron Padlocks,

R. R. Car and Switch Locks,

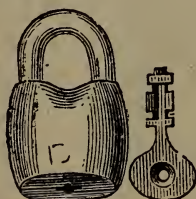
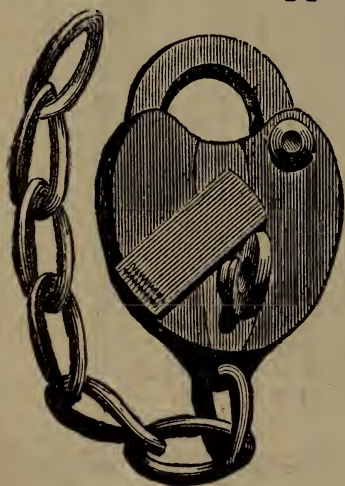
PATENT REVERSIBLE NIGHT LATCHES,

Also Conductors' HAND and SIGNAL

LANTERNS,

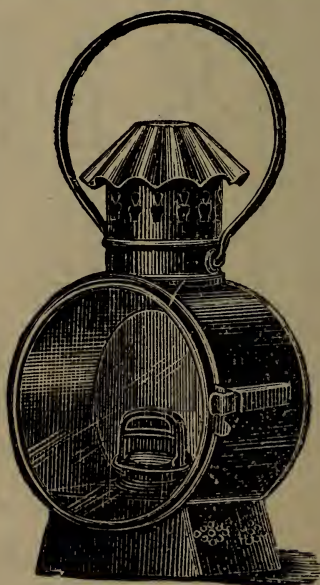
Dash, Carriage and Bicycle Lamps, Etc.

Illustrated Catalogue sent to
the Trade on Application.



Romer & Co.

28 to 42
SUMMER AVE.,
Newark, N. J.



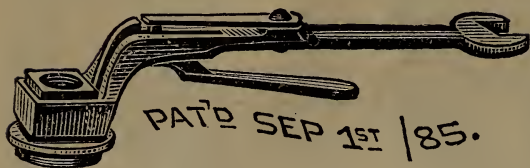
HOPKINS' HANDY NOTES AND QUERIES.

Weight of Iron, Steel, Copper and Brass Plates.

DIAMETER AND THICKNESS DETERMINED BY AMERICAN GAUGE.

No. of Gauge.	Size of each No.	WEIGHT OF PLATES PER SQUARE FOOT.			
		Wrought Iron.	Steel.	Copper.	Brass.
	Inch.	Lbs.	Lbs.	Lbs.	Lbs.
0000	.46000	17.25	17.48	20.838	19.688
000	.40964	15.3615	15.5663	18.557	17.533
00	.36480	13.68	13.8624	16.525	15.613
0	.32486	12.1823	12.3447	14.716	13.904
1	.28930	10.8488	10.9934	13.105	12.382
2	.25763	9.6611	9.7899	11.671	11.027
3	.22942	8.6033	8.7180	10.393	9.8192
4	.20431	7.6616	7.7638	9.2552	8.7445
5	.18194	6.8228	6.9137	8.2419	7.787
6	.16202	6.0758	6.1568	7.3395	6.9345
7	.14428	5.4105	5.4826	6.5359	6.1752
8	.12849	4.8184	4.8826	5.8206	5.4994
9	.11443	4.2911	4.3483	5.1837	4.8976
10	.10189	3.8209	3.8718	4.6156	4.3609
11	.090742	3.4028	3.4482	4.1106	3.8838
12	.080808	3.0303	3.0707	3.6606	3.4586
13	.071961	2.6985	2.7345	3.2598	3.0799
14	.064084	2.4032	2.4352	2.9030	2.7423
15	.057068	2.1401	2.1686	2.5852	2.4425
16	.050820	1.9058	1.9312	2.3021	2.1751
17	.045257	1.6971	1.7198	2.0501	1.937
18	.040303	1.5114	1.5315	1.8257	1.725
19	.035890	1.3459	1.3638	1.6258	1.5361
20	.031961	1.1985	1.2145	1.4478	1.3679
21	.028462	1.0673	1.0816	1.2893	1.2182
22	.025347	.95051	.96319	1.1482	1.0849
23	.022571	.84641	.8577	1.0225	.96604
24	.020100	.75375	.7638	.91053	.86028
25	.017900	.67125	.6802	.81087	.76612
26	.01594	.59775	.60572	.72208	.68223
27	.014195	.53231	.53941	.64303	.60755
28	.012641	.47404	.48036	.57264	.54103
29	.011257	.42214	.42777	.50994	.48180
30	.010025	.37594	.38095	.45413	.42907
31	.008928	.3348	.33926	.40444	.38212
32	.007950	.29813	.3021	.36014	.34026
33	.007080	.2655	.26904	.32072	.30302
34	.006304	.2364	.23955	.28557	.26981
35	.005614	.21053	.21333	.25431	.24028
36	.005000	.1875	.19	.2265	.2140
37	.004453	.16699	.16921	.20172	.19059
38	.003965	.14869	.15067	.17961	.1697
39	.003531	.13241	.13418	.15995	.15113
40	.003144	.1179	.11947	.14242	.13456
Specific Grav.....		7.200	7.296	8.698	8.218
Weight per Cubic Foot.....		450.	456.	543.6	513.6

Indispensable to Everyone Owning a Carriage.



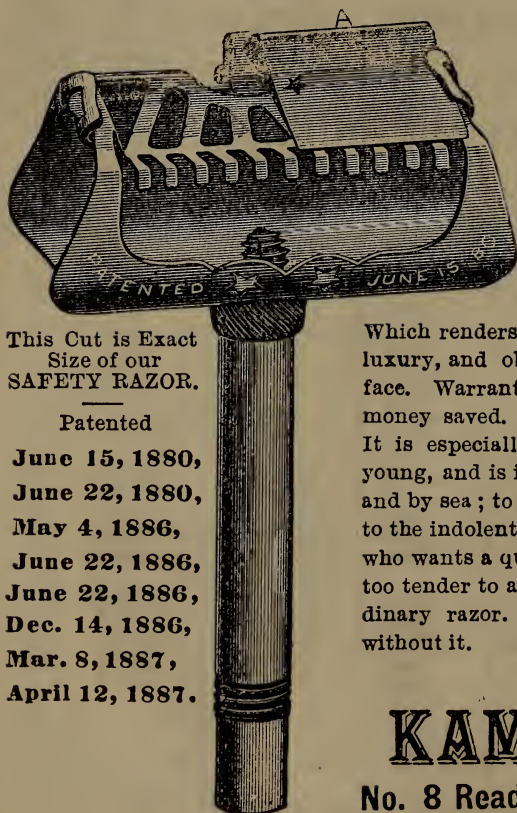
COOK'S Patent Carriage Wrench

The above cut represents the Best CARRIAGE WRENCH that has ever been placed upon the market. The nut is firmly held in the Wrench by a spring (instantly applied and released), thus preventing its falling to the ground, and also the hands from getting greasy while removing from or attaching to axle. It is strongly made of malleable iron, well finished and in three sizes, $\frac{7}{8}$ -in., 1-in., $1\frac{1}{8}$ -in. Merchants will find this a very salable wrench. A sample dozen, assorted sizes, will be *Sent by Express to any address* on receipt of **\$2.00**,

or one Wrench by Mail on receipt of 36c.

R. B. THOMAS, Sole Agent,

NO. 90 CHAMBERS ST., - NEW YORK.



THE STAR Safety Razor

The Medal of Superiority awarded at American Institute, 1884-5-6; and also, a Silver Medal awarded at Mechanics' Institute, San Francisco, Cal., 1886.

A Great Invention

This Cut is Exact
Size of our
SAFETY RAZOR.

Patented

**June 15, 1880,
June 22, 1880,
May 4, 1886,
June 22, 1886,
June 22, 1886,
Dec. 14, 1886,
Mar. 8, 1887,
April 12, 1887.**

Which renders shaving an easy and convenient luxury, and obviates all danger of cutting the face. Warranted to shave clean. Time and money saved. Delays in barber shops avoided. It is especially adapted to the aged and to the young, and is indispensable to travelers by land and by sea; to miners and persons camping out; to the indolent and the luxurious; to the man who wants a quick shave, and him whose skin is too tender to admit of the application of the ordinary razor. Once used you will never be without it.

KAMPFE BROS.,

No. 8 Reade St., - New York.

HOPKINS' HANDY NOTES AND QUERIES.

RULES FOR COMPUTING WEIGHTS OF METALS.

I.—CAST IRON.

To find the weight of a cast-iron rod or bar: multiply the weight of a wrought rod or bar from the usual tables, and deduct 2.27 of its weight.

II.—WROUGHT IRON.

To compute the weight of any piece of wrought iron: find the number of cubic inches it contains and multiply by .2816. This will give the weight in pounds.

III.—CAST IRON.

Multiply the number of cubic inches by .2607.

IV.—COPPER.

To compute the weight of copper: ascertain the number of cubic inches, and multiply by .3242.

V.—LEAD.

To compute the weight of lead: multiply the number of cubic inches by .41015.

VI.—BRASS.

To compute the weight of brass: multiply the number of cubic inches by .3112.

USEFUL MATHEMATICAL RULES.

To find the area of a parallelogram: multiply the length by the breadth.

To find the circumference of a circle: multiply the diameter by 3.14159.

To find the diameter of a circle: multiply the circumference by .31831.

To find the area of a circle: multiply the square of the diameter by .7854; or, multiply the square of the circumference by .079577; or, multiply half the diameter by half the circumference.

To find the area of a circular ring: multiply the sum of the diameters of the two circles by the difference of the diameters, and that product by .7854.

To find the side of a square that shall equal the area of a given diameter or circumference: multiply the diameter of the circle by .886227; or, multiply the circumference of the circle by .282094.

To find the diameter of a circle that shall contain the area of a given square: multiply the side of the given square by 1.12838.

To find the side of the largest square that can be inscribed in a circle of a given diameter or circumference: multiply the given diameter by .707106; or, multiply the given circumference by .225079.

To find the circumference of a circle required to exactly admit a square of a given side: multiply the given side by .225079.

IRON CLAD MANUFACTURING CO.

Largest Manufacturers of

GALVANIZED SHEET-IRON GOODS

IN THE UNITED STATES.

Such as

COAL HODS, ASH CANS,
Water and Fire Buckets,



Galvanized Iron Sprinklers,

Refrigerator or Drip Pans,

WELL BUCKETS, OIL TANKS, ETC.

Also Manufacturers of the Justly-Celebrated

Iron Clad Milk Cans,

In New York, Philadelphia, Cincinnati, Baltimore, Chicago, Boston
and St. Louis patterns.

GALVANIZED-IRON RANGE BOILERS,

FRY-PANS, RIVETS, ETC.

IRON CLAD MANUFACTURING CO.,

22 CLIFF ST., NEW YORK.

HOPKINS' HANDY NOTES AND QUERIES.

[From "The Metal Worker"]

GALVANIZED SHEET IRON.

TABLE, Showing Gauges, with Weights per Square Foot; List Price per Pound; Cost per Square Foot at List, together with Cost per Pound and per Square Foot at Different Discounts, ranging from 25 per cent. to 55 per cent.

In this Table prices are calculated to three places of decimals, which is sufficiently accurate for all practical purposes.

Gauge Number.....	20	21	22	23	24	25	26	27	28
Weight per square foot, oz.....	.28	.24	.21	.19	.17	.16	.15	.14	.13
List price per pound.....	.12	.13	.13	.13	.13	.14	.14	.15	.16
Cost per square foot at List.....	.21	.195	.171	.154	.138	.14	.131	.131	.13
Cost 25 per cent. Discount.....	.09	.098	.098	.098	.098	.105	.105	.105	.105
Cost 30 per cent. Discount.....	.087	.094	.094	.094	.094	.102	.102	.102	.102
Cost 35 per cent. Discount.....	.084	.091	.091	.091	.091	.098	.098	.098	.098
Cost 40 per cent. Discount.....	.081	.088	.088	.088	.088	.095	.095	.095	.095
Cost 45 per cent. Discount.....	.078	.085	.085	.085	.085	.092	.092	.092	.092
Cost 50 per cent. Discount.....	.075	.082	.082	.082	.082	.089	.089	.089	.089
Cost 55 per cent. Discount.....	.072	.079	.079	.079	.079	.086	.086	.086	.086
per lb.....	.084	.087	.087	.087	.087	.093	.093	.093	.093
per square foot.....	.14	.13	.114	.103	.092	.083	.088	.088	.087
per lb.....	.078	.085	.085	.085	.085	.091	.091	.091	.091
per square foot.....	.137	.127	.111	.10	.09	.081	.085	.085	.085
per lb.....	.075	.081	.061	.051	.041	.038	.038	.038	.038
per square foot.....	.131	.122	.107	.096	.086	.088	.082	.082	.081
per lb.....	.072	.078	.078	.078	.078	.084	.084	.084	.084
per square foot.....	.126	.117	.102	.093	.083	.084	.079	.079	.078
per lb.....	.069	.075	.075	.075	.075	.081	.081	.081	.081
per square foot.....	.121	.112	.098	.089	.079	.081	.075	.075	.075
per lb.....	.066	.072	.072	.072	.072	.077	.077	.077	.077
per square foot.....	.116	.107	.094	.085	.076	.077	.072	.072	.072
per lb.....	.063	.068	.063	.063	.063	.074	.069	.069	.068
per square foot.....	.11	.102	.09	.081	.073	.074	.069	.069	.068
per lb.....	.06	.065	.065	.065	.065	.07	.07	.07	.07
per square foot.....	.105	.098	.085	.077	.069	.07	.065	.065	.065
per lb.....	.057	.062	.062	.062	.062	.067	.067	.067	.067
per square foot.....	.10	.093	.081	.073	.066	.067	.062	.062	.062
per lb.....	.054	.059	.059	.059	.059	.063	.063	.063	.063
per square foot.....	.095	.088	.077	.060	.052	.053	.059	.059	.059

HOPKINS' HANDY NOTES AND QUERIES.

RUSSIA SHEET IRON.

	Size.	Weight per Sheet.	Wire Gauge.
No. 7.....	28x56 in.	6 $\frac{1}{4}$ lbs.	No. 29
" 8.....	"	7 $\frac{1}{4}$ "	" 28
" 9.....	"	8 "	" 27
" 10.....	"	9 "	" 26
" 11.....	"	10 "	" 25
" 12.....	"	10 $\frac{3}{4}$ "	" 24 $\frac{1}{2}$
" 13.....	"	11 $\frac{3}{4}$ "	" 24
" 14.....	"	12 $\frac{1}{2}$ "	" 23 $\frac{1}{4}$
" 15.....	"	13 $\frac{1}{2}$ "	" 22 $\frac{3}{8}$
" 16.....	"	14 $\frac{1}{2}$ "	" 21 $\frac{1}{2}$

SHEET ZINC.

Zinc Gauge.	Stubs' Wire Gauge.	Weight per sq. foot.	Approximate Weight per sheet.							
			24	26	28	30	32	34	36	40
			x 84	x 84	x 84	x 84	x 84	x 84	x 84	x 84
		oz.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
6	29	7	6 $\frac{1}{8}$	6 $\frac{3}{8}$	7 $\frac{1}{8}$	7 $\frac{3}{8}$	8 $\frac{1}{4}$	8 $\frac{3}{4}$	9 $\frac{1}{4}$	
7	28 $\frac{1}{2}$	8	7	7 $\frac{5}{8}$	8 $\frac{1}{8}$	8 $\frac{3}{8}$	9 $\frac{3}{8}$	9 $\frac{1}{2}$	10 $\frac{1}{2}$	
8	28	9	7 $\frac{7}{8}$	8 $\frac{1}{2}$	9 $\frac{1}{4}$	9 $\frac{7}{8}$	10 $\frac{1}{2}$	11 $\frac{1}{4}$	11 $\frac{3}{4}$	
9	27	10 $\frac{1}{2}$	9 $\frac{1}{4}$	10	10 $\frac{3}{4}$	11 $\frac{1}{2}$	12 $\frac{1}{4}$	13	13 $\frac{1}{2}$	
10	26	12	10 $\frac{1}{2}$	11 $\frac{1}{2}$	12	13	14	15	16	
11	25	13 $\frac{1}{2}$	12	13	14	15	16	17	18	
12	24	15	13	14	15	16 $\frac{1}{2}$	17 $\frac{1}{2}$	18 $\frac{1}{2}$	20	
13	23	17	15	16	17	18 $\frac{1}{2}$	20	21	22	25
14	22	19	17	18	19 $\frac{1}{2}$	21	22	23 $\frac{1}{2}$	25	28
15	21	22	19	21	22 $\frac{1}{2}$	24	25 $\frac{1}{2}$	27	29	32
16	20	25	22	24	25 $\frac{1}{2}$	27	29	31	33	36
17	19	28	25	27	29	31	33	35	37	41
18	18	31	27	30 $\frac{1}{2}$	32	34	36	38	41	45
19	17	35	31	33	36	38	41	44	46	51
20	16	40	35	38	41	44	47	50	53	59

SHEET LEAD

IS MADE TO WEIGH, PER SQUARE FOOT :

2 $\frac{1}{2}$. 3, 3 $\frac{1}{2}$ 4, 4 $\frac{1}{2}$, 5, 6, 7, 8, 9, 10 pounds, and upwards.

HOPKINS' HANDY NOTES AND QUERIES.

STANDARD WEIGHTS OF LEAD PIPE, Etc.

WEIGHT PER FOOT OF LEAD PIPE AND TIN-LINED LEAD PIPE.

Cal- ibre	AAA Brooklyn.	AA Ex Strong	A Strong.	B Medium.	C Light.	D Ex Light.	E Fountain.
	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.
$\frac{3}{8}$	1 8	1 5	1 2	1 0	0 13	0 10	0 8
$\frac{1}{2}$	3 0	2 0	1 12	1 4	1 0	0 13	0 11
$\frac{5}{8}$	3 8	2 12	2 8	2 0	1 12	1 8	1 0
$\frac{3}{4}$	4 8	3 8	3 0	2 4	2 0	1 12	1 4
1	6 0	4 12	4 0	3 4	2 8	2 0	1 8
$1\frac{1}{4}$	6 12	5 12	4 12	3 12	3 0	2 8	2 0
$1\frac{1}{2}$	9 0	8 0	6 4	5 0	4 4	3 8	3 4
2	10 12	9 0	7 0	6 0	5 4	4 0	

LEAD WASTE PIPE.

$1\frac{1}{2}$ inch, 2 lbs.....per foot.	4 inch, 4 $\frac{1}{2}$, 5, 6 & 8 lbs...per foot.
2 " 3 lbs..... "	4 $\frac{1}{2}$ inch, 6, 6 $\frac{1}{2}$ & 8 lbs... "
2 $\frac{1}{2}$ " 4 and 6 lbs.... "	5 inch, 8, 10 & 12 lbs.... "
3 " 3 $\frac{1}{2}$, 4 $\frac{1}{2}$ & 5 lbs. "	6 " 9 $\frac{1}{4}$ and upwards.. "

EXTRA WEIGHTS OF LEAD PIPE.

Calibre.	7-16 Thick.	$\frac{3}{8}$ Thick.	5-16 Thick.	$\frac{1}{2}$ Thick.	3-16 Thick.
	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.	Lb. Oz.
2 $\frac{1}{2}$ inches..	0 0	16 11	13 11	11 0	7 13
3 " ..	0 0	19 10	16 0	12 0	9 0
3 $\frac{1}{2}$ " ..	26 10	21 10	18 5	15 0	9 8
4 " ..	30 0	25 0	21 0	16 0	12 8
4 $\frac{1}{2}$ " ..	0 0	0 0	0 0	18 0	14 0
5 " ..	0 0	31 0	0 0	20 0	0 0

PATENT FINISH DROP SHOT.

AMERICAN STANDARD SIZES.

	Diameter in 100ths of an inch.	No. of Shot to the oz.		Diameter in 100ths of an inch.	No. of Shot to the oz.
Extra Fine Dust..	1 $\frac{1}{2}$	84021	No. 6.....	11	218
Fine Dust.....	3	10784	" 5.....	12	168
Dust.....	4	4565	" 4.....	13	132
No. 12.....	5	2326	" 3.....	14	106
" 11.....	6	1346	" 2.....	15	86
" 10.....	7	848	" 1.....	16	71
" 9.....	8	688	" B.....	17	59
" 8.....	9	568	" BB.....	18	50
" 7.....	10	472	" BBB.....	19	42
" 6.....	11	399	" T.....	20	36
" 5.....	12	338	" TT.....	21	31
" 4.....	13	291	" F.....	22	27
" 3.....	14	254	" FF.....	23	24

COMPRESSED BUCK SHOT.

	Diameter in 100ths of an inch.	No. of Balls to the lb.		Diameter in 100ths of an inch.	No. of Balls to the lb.
No. 3.....	25	284	No. 00.....	34	115
" 2.....	27	232	" 000.....	36	93
" 1.....	30	173	Balls.....	38	85
" 0.....	32	140	"	44	50

HOPKINS' HANDY NOTES' AND QUERIES.

Weight and Dimensions of Wrought Iron Welded Pipes.

FOR GAS, STEAM AND WATER.

Inside Diameter in inches.	Outside Diameter in inches.	Weight per foot in pounds.	Inside Diameter in inches.	Outside Diameter in inches.	Weight per foot in pounds.
$\frac{1}{8}$	0.40	0.24	3	3.5	7.54
$\frac{1}{4}$	0.54	0.42	$3\frac{1}{2}$	4.0	9.05
$\frac{3}{8}$	0.67	0.56	4	4.5	10.72
$\frac{1}{2}$	0.84	0.85	$4\frac{1}{2}$	5.0	12.49
$\frac{3}{4}$	1.05	1.12	5	5.56	14.56
1	1.31	1.67	6	6.62	18.77
$1\frac{1}{4}$	1.66	2.25	7	7.62	23.41
$1\frac{1}{2}$	1.95	2.69	8	8.62	28.35
2	2.37	3.66	9	9.68	34.67
$2\frac{1}{2}$	2.87	5.77	10	10.75	40.64

Lap Welded American Charcoal Iron Boiler Tubes.

TABLE OF STANDARD SIZES.

External Diameter.	External Circumference.	Internal Diameter.	Internal Circumference.	Thickness.	Length of Pipe per sq. ft. of inside surface.	Length of Pipe per sq. ft. of outside surface.	Internal Area.	External Area.	Weight per foot.
Ins.	Ins.	Ins.	Ins.	Ins.	Feet.	Feet.	Ins.	Ins.	Lbs.
1	3.142	0.856	2.639	0.072	4.460	3.819	0.575	0.785	0.703
$1\frac{1}{8}$	3.927	1.126	3.474	0.072	3.455	3.056	0.960	1.227	0.9
$1\frac{1}{4}$	4.712	1.334	4.191	0.083	2.863	2.547	1.396	1.767	1.250
$1\frac{3}{4}$	5.598	1.560	4.901	0.095	2.443	2.183	1.911	2.405	1.665
2	6.283	1.804	5.667	0.093	2.118	1.909	2.556	2.42	1.981
$2\frac{1}{8}$	7.069	2.054	6.494	0.093	1.850	1.698	3.314	3.976	2.238
$2\frac{1}{4}$	7.854	2.283	7.172	0.109	1.673	1.528	4.094	4.939	2.755
$2\frac{3}{4}$	8.639	2.533	7.957	0.109	1.508	1.390	5.439	5.940	3.045
3	9.425	2.783	8.743	0.109	1.373	1.273	6.083	7.069	3.333
$3\frac{1}{8}$	10.210	3.012	9.462	0.119	1.268	1.175	7.125	8.296	3.953
$3\frac{1}{4}$	10.995	3.262	10.248	0.119	1.171	1.091	8.357	9.621	4.272
$3\frac{3}{4}$	11.781	3.512	11.033	0.119	1.088	1.018	9.687	11.045	4.590
4	12.566	3.741	11.753	0.130	1.023	0.955	10.992	12.566	5.320
$4\frac{1}{2}$	14.137	4.241	13.323	0.130	0.901	0.849	14.126	15.904	6.011
5	15.708	4.72	14.818	0.140	0.809	0.764	17.497	19.635	7.226
6	18.849	5.699	17.904	0.151	0.670	0.637	25.509	28.274	9.346
7	21.991	6.657	20.914	0.172	0.574	0.545	34.805	38.484	12.435
8	25.132	7.633	23.989	0.182	0.500	0.478	45.795	50.265	15.109
9	28.374	8.615	27.055	0.193	0.444	0.424	58.291	63.617	18.002
10	31.416	9.573	30.074	0.214	0.399	0.382	71.975	78.540	22.19

Light Wrought Iron Artesian Tube and Casing for Oil Wells.

STANDARD SIZES.

Outside Diameter in inches.	Inside Diameter in inches.	Weight per Foot, Pounds.	Outside Diameter, Inches.	Inside Diameter, Inches.	Weight per Foot, Pounds.
$1\frac{1}{4}$	$1\frac{1}{2}$	1.665	$4\frac{1}{4}$	4	5.500
$2\frac{1}{4}$	2	2.238	$4\frac{1}{2}$	$4\frac{1}{4}$	6.010
$2\frac{3}{4}$	$2\frac{1}{4}$	2.755	5	$4\frac{3}{4}$	7.226
$2\frac{1}{2}$	$2\frac{1}{2}$	3.045	$5\frac{1}{4}$	5	7.667
3	$2\frac{3}{4}$	3.333	$5\frac{1}{2}$	5 3-16	8.033
$3\frac{1}{4}$	3	3.958	6	$5\frac{1}{2}$	9.346
$3\frac{3}{4}$	$3\frac{1}{4}$	4.272	$6\frac{1}{4}$	$6\frac{1}{4}$	10.064
$3\frac{1}{2}$	$3\frac{1}{2}$	4.950	7	6 3/8	12.435
4	$3\frac{3}{4}$	5.320	8	7 1/8	15.109
			$8\frac{1}{4}$	$8\frac{1}{4}$	16.155

HOPKINS' HANDY NOTES AND QUERIES.

BRAZED COPPER PIPES.

WEIGHT PER RUNNING FOOT IN POUNDS.

Diam. inch.	Thickness in Inches.					
	1-16	3-16	$\frac{1}{8}$	5-16	$\frac{3}{16}$	7-16
1	.8	1.2	1.7	2.7	3.8	4.9
$\frac{1}{2}$	1.	1.5	2.1	3.3	4.5	6.
$\frac{3}{4}$	1.2	1.8	2.5	3.8	5.3	6.9
$\frac{1}{2}$	1.4	2.1	2.8	4.4	6.	7.8
2	1.5	2.4	3.2	4.9	6.8	8.7
$\frac{1}{2}$	1.8	2.6	3.6	5.5	7.6	9.7
$\frac{3}{4}$	1.9	2.9	4.	6.1	8.4	10.6
$\frac{1}{2}$	2.1	3.2	4.4	6.7	9.1	11.7
3	2.3	3.5	4.7	7.3	9.9	12.5
$\frac{1}{2}$	2.7	4.	5.5	8.4	11.4	14.4
4	3.	4.6	6.3	9.5	12.9	16.3
$\frac{1}{2}$	3.4	5.2	7.	10.7	14.4	18.2
5	3.8	5.7	7.8	11.8	16.	20.1
$\frac{1}{2}$	4.2	6.3	8.5	13.1	17.5	22.5
6	4.6	6.8	9.3	14.1	19.	23.9

Standard Sizes, Lengths, &c., of Seamless Drawn Tubing.

Inches Outside Diam.	Length Feet.	Brown & Sharpe's Gauge.	Weights per Foot.		Inches Outside Diam.	Length Feet.	Brown & Sharpe's Gauge.	Weights per Foot.	
			Brass.	Copper.				Brass.	Copper.
$\frac{5}{8}$	12	16	$\frac{3}{8}$	$\frac{3}{8}$	1 15-16	12	11 & 10	2	2 1-10
$\frac{3}{4}$	12	15	$\frac{1}{2}$	$\frac{1}{2}$	2	12	"	2 1-5	2 $\frac{1}{4}$
13-16	12	15	9-16	9-16	2 $\frac{1}{8}$	10	"	2 $\frac{1}{4}$	2 $\frac{3}{8}$
$\frac{7}{8}$	12	15	$\frac{5}{8}$	$\frac{5}{8}$	2 $\frac{1}{4}$	10	"	2 $\frac{3}{8}$	2 $\frac{1}{2}$
15-16	12	15	11-16	11-16	2 $\frac{3}{8}$	10	"	2 $\frac{1}{2}$	2 $\frac{7}{8}$
1	12	14	$\frac{3}{4}$	$\frac{3}{4}$	2 $\frac{1}{2}$	10	S & 8 $\frac{1}{2}$	2 $\frac{1}{2}$	3
1 $\frac{1}{8}$	12	14	$\frac{7}{8}$	$\frac{7}{8}$	2 $\frac{3}{4}$	10	"	3	3 $\frac{1}{8}$
1 $\frac{1}{4}$	12	13	1 $\frac{1}{4}$	1	2 $\frac{3}{4}$	10	"	3 $\frac{1}{8}$	3 $\frac{1}{4}$
1 $\frac{3}{8}$	12	12 $\frac{1}{2}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	3	10	"	3 1-3	3 $\frac{3}{8}$
1 $\frac{1}{2}$	12	12	1 $\frac{1}{2}$	16-10	3 $\frac{1}{4}$	10	"	3 $\frac{3}{8}$	4 $\frac{1}{8}$
1 $\frac{5}{8}$	12	11 $\frac{1}{2}$	1 $\frac{5}{8}$	17-10	3 $\frac{1}{2}$	10	"	4 $\frac{1}{4}$	4 $\frac{3}{8}$
1 $\frac{3}{4}$	12	11	1 $\frac{3}{4}$	18-10	4	10	"	5	5 $\frac{1}{4}$
1 13-16	12	11	1 13-16	19-10	5	10	"	7	8
1 $\frac{7}{8}$	12	11 & 10	1 $\frac{7}{8}$	1 15-16					

Weight of Brass, Copper, and Zinc Tubing, per Foot.

Numbered by Brown & Sharpe's Gauge. Weights in Thousandths of Lbs.

BRASS. No. 17.		BRASS. No. 20.		COPPER Lightning Rod Tube. No. 23.	
Inch.	Lbs.	Inch.	Lbs.	Inch.	Lbs.
$\frac{1}{4}$	.107	$\frac{1}{8}$	.032	$\frac{1}{2}$	.162
5-16	.157	3-16	.039	9-16	.176
$\frac{3}{8}$	.185	$\frac{1}{4}$	.063	$\frac{3}{8}$	.186
7-16	.234	5-16	.106	11-16	.211
$\frac{1}{2}$	.266	$\frac{3}{8}$	.126	$\frac{1}{2}$	.229
9-16	.318	7-16	.158		
$\frac{5}{8}$	.333	$\frac{1}{2}$	.189		
$\frac{3}{4}$	.377	9-16	.208		
$\frac{7}{8}$	.462	$\frac{3}{4}$	.220		
1	.542	$\frac{1}{2}$	.252		
1 $\frac{1}{8}$	.675	$\frac{3}{8}$	.284		
1 $\frac{1}{4}$	.740	1	.378		
1 $\frac{3}{8}$	.915	1 $\frac{1}{4}$	.500		
1 $\frac{1}{2}$	.980	1 $\frac{1}{2}$	.580		
2	1.90				
2 $\frac{1}{2}$	1.506				
3	2.188				

ZINC.

No. 20.

Inch.	Lbs.
$\frac{1}{4}$	.161
$\frac{3}{8}$	.185
$\frac{1}{2}$	.234
$\frac{3}{4}$	.272
1	.311
1 $\frac{1}{4}$	.380
1 $\frac{1}{2}$	.452

HOPKINS' HANDY NOTES AND QUERIES.

Value of Iron.

VALUE PER GROSS TON (2240 LBS.) OF IRON AT FROM 1-10TH OF A CENT TO 10 CENTS PER POUND, INCREASING AT RATE OF 1-10TH OF A CENT PER POUND.

Per lb. in cts. & 1-10ths.	Price Per Ton	Per lb. in cts. & 1-10ths.	Price Per Ton	Per lb. in cts. & 1-10ths.	Price Per Ton
1-10	\$ 2.24	3 5/10	\$ 78.40	6 8-10	\$152.32
2-	4.48	6-	80.64	9-	154.56
3-	6.72	7-	82.88	7	156.80
4-	8.96	8-	85.12	1-10	158.04
5-	11.20	9-	87.36	2-	161.28
6-	13.44	4	89.60	3-	163.52
7-	15.68	1-10	91.84	4-	165.76
8-	17.92	2-	94.08	5-	168.00
9-	20.16	3-	96.32	6-	170.24
1	22.40	4-	98.56	7-	172.48
1-10	24.64	5-	100.80	8-	174.72
2-	26.88	6-	103.04	9-	176.96
3-	29.12	7-	105.28	8	179.20
4-	31.36	8-	107.52	1-10	181.44
5-	33.60	9-	109.76	2-	183.68
6-	35.84	5	112.00	3-	185.92
7-	38.08	1-10	114.24	4-	188.16
8-	40.32	2-	116.48	5-	190.40
9-	42.56	3-	118.72	6-	192.64
2	44.80	4-	120.96	7-	194.88
1-10	47.04	5-	123.20	8-	197.12
2-	49.28	6-	125.44	9-	199.36
3-	51.52	7-	127.68	9	201.60
4-	53.76	8-	129.92	1-10	203.84
5-	56.00	9-	132.16	2-	206.08
6-	58.24	6	134.40	3-	208.32
7-	60.48	1-10	136.64	4-	210.56
8-	62.72	2-	138.88	5-	212.80
9-	64.96	3-	141.12	6-	215.04
3	67.20	4-	143.36	7-	217.28
1-10	69.44	5-	145.60	8-	219.52
2-	71.68	6-	147.84	9-	221.76
3-	73.92	7-	150.08	10	224.00
4-	76.16				

Hoop and Scroll Iron.

NUMBER OF FEET IN A BUNDLE OF FIFTY-SIX POUNDS.

HOOP IRON.			SCROLL IRON.		
Size.		Feet in Bundle.	Size.		Feet in Bundles.
Width.	Thick.		Width.	Thick.	
5/8 inches.	No. 21	815	3/8 inches.	No. 10	240
3/4 "	" 20	630	3/8 "	" 16	430
7/8 "	" 19	450	3/8 "	" 14	347
1 "	" 13	360	3/8 "	" 10	190
1 1/8 "	" 17	278	3/8 "	" 16	360
1 1/4 "	" 15	217	3/8 "	" 14	290
1 1/2 "	" 15	160	3/8 "	" 12	208
1 3/4 "	" 15	139	3/8 "	" 10	160
2 "	" 14	110	3/8 "	" 16	310
			7/8 "	" 14	249
			7/8 "	" 12	175
			1 "	" 16	270
			1 "	" 14	216
			1 "	" 12	152

HOPKINS' HANDY NOTES AND QUERIES.

LIST OF EXTRAS ON BAR IRON.

ORDINARY SIZES. } Rounds and Squares. $\frac{3}{4}$ to 2 in. diam.
Flats.....1 to $4 \times \frac{3}{4}$ to $1\frac{1}{2}$ and $4\frac{1}{8}$ to $6 \times \frac{3}{4}$ to 1.

EXTRA SIZES.

Rounds and Squares.	Extra in cts. per lb	Flats.	Extra in cts. per lb	Flats.	Extra in cts. per lb
No 6 and $\frac{3}{16}$ in.	1.3	$\frac{1}{32} \times \frac{3}{4}$	4.0	$\frac{7}{8} \times \frac{7}{8}$	1.5
No. 5.....	1.0	$\frac{1}{16} \times \frac{1}{8}$	3.5	$\frac{7}{8} \times \frac{1}{4}$	1.3
No. 4.....	0.8	$\frac{1}{16} \times \frac{3}{8}$	3.0	$\frac{1}{8} \times \frac{9}{16} \times \frac{3}{16}$	1.2
Nos. 2, 3, $\frac{1}{4}$ & $\frac{9}{32}$	0.7	$\frac{1}{16} \times \frac{1}{8}$	2.5	$\frac{1}{8} \times \frac{1}{8} \times \frac{1}{4}$ to $\frac{3}{8}$	1.1
$\frac{5}{16}$	0.6	$\frac{1}{16} \times \frac{3}{8}$	3.6	$\frac{1}{8} \times \frac{1}{8} \times \frac{1}{16}$	0.9
$\frac{3}{8}$	0.5	$\frac{1}{16} \times \frac{1}{4}$	3.0	$\frac{1}{8} \times \frac{1}{8} \times \frac{1}{4}$ & $\frac{5}{16}$	0.7
$\frac{7}{16}$	0.4	$\frac{1}{16} \times \frac{3}{8}$	2.5	$\frac{1}{8} \times \frac{1}{8} \times \frac{3}{8}$ to $\frac{1}{2}$	0.5
$\frac{1}{2}$ & $\frac{9}{16}$	0.2	$\frac{1}{16} \times \frac{1}{4}$	2.3	$\frac{1}{8} \times \frac{1}{8}$	0.7
$\frac{5}{8}$ & $\frac{11}{16}$	0.1	$\frac{1}{16} \times \frac{3}{8}$	2.0	$\frac{1}{8} \times \frac{1}{8}$ & $\frac{5}{16}$	0.5
$2\frac{1}{8}$ to $2\frac{7}{8}$	0.1	$\frac{1}{2} \times \frac{1}{2}$	1.8	\times to $\frac{5}{8}$	0.4
3 to $3\frac{1}{2}$	0.3	$\frac{1}{2} \times \frac{1}{4}$	1.6	$\times \frac{3}{8}$	0.6
$3\frac{9}{16}$ to 4.....	0.5	$\frac{1}{32} \times \frac{3}{8}$	3.0	$\times \frac{1}{4}$ & $\frac{5}{16}$	0.5
$4\frac{1}{16}$ to $4\frac{1}{2}$	0.6	$\frac{1}{32} \times \frac{1}{4}$	2.6	$\times \frac{3}{8}$ to $\frac{3}{4}$	0.4
$4\frac{9}{16}$ to 5.....	0.8	$\frac{1}{32} \times \frac{9}{16}$	2.5	$1 \times \frac{3}{8}$	0.4
HALF ROUND.		$\frac{1}{32} \times \frac{3}{8}$	2.2	1 to $6 \times \frac{1}{4} \times \frac{5}{16}$	0.2
$\frac{7}{8}$ to $1\frac{1}{4}$	0.5	$\frac{1}{32} \times \frac{3}{8}$	1.8	2 to $4 \times 1 \times \frac{9}{16}$ to 2 ..	0.2
$\frac{3}{4}$ & $\frac{1}{2}$	0.6	$\frac{1}{32} \times \frac{1}{4}$	1.6	2 to $4 \times 2 \times \frac{1}{16}$ to 3 ..	0.3
$\frac{5}{8}$ & $\frac{1}{2}$	0.7	$\frac{1}{16} \times \frac{1}{8}$	2.3	$4\frac{1}{16}$ to $6 \times 1 \times \frac{1}{16}$ to 2	0.2
$\frac{1}{2}$ & $\frac{9}{16}$	0.9	$\frac{1}{16} \times \frac{3}{8}$	1.9	$4\frac{1}{16}$ to $6 \times 2 \times \frac{1}{16}$ to 3	0.4
$\frac{3}{8}$ & $\frac{7}{16}$	1.1	$\frac{1}{16} \times \frac{1}{8}$	1.6		

For cutting to specific lengths, 10 to 20 feet, 0.2 cent extra.

CAST STEEL CROWBARS.

Weight.....	—	8	10	12	14	16	18
Inch Square.....	—	$\frac{7}{8}$	1	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{3}{16}$	$1\frac{1}{4}$
Inches in Length.	—	48	54	62	63	66	67
Weight.....	20	22	24	26	28	30	
Inch Square.....	$1\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$	
Inches in Length..	72	72	72	74	74	76	

COPPER SHEATHING SHEETS.

Sheathing is the name applied only to sheets measuring 14x48 inches.

Showing Wt. per sheet. No. of sheets per case and Wt per case.

Oz. per sq. foot...	16	18	20	22	24	26	28	30	32
Pounds per sheet.	4.10	5.4	5.13	6.7	7.	7.9	8.3	8.12	9.5
Sheets per case...	125	115	100	100	85	80	75	70	65
Pounds per case..	583	604	583	642	595	607	613	613	607

HOPKINS' HANDY NOTES AND QUERIES.

Weight of Flat Iron.

WEIGHT OF RUNNING FOOT IN POUNDS.

Width in Inches.		Thickness in Inches.					C.		Width in Inches.					Thickness in Inches.				
		1-16	1-8	3-16	1-4	5-16	3-8			1-16	1-8	3-16	1-4	5-16	3-8			
1	.....	.21	.41	.62	.83	1.04	1.25	5½	.....	1.12	2.24	3.36	4.48	5.6	6.72
1½	.....	.23	.47	.7	.94	1.17	1.41	½	.....	1.14	2.29	3.44	4.58	5.73	6.88
2	.....	.26	.52	.78	1.04	1.3	1.56	¾	.....	1.17	2.34	3.52	4.69	5.86	7.03
2½	.....	.29	.57	.86	1.14	1.43	1.72	¾	.....	1.2	2.39	3.59	4.79	6	7.19
3	.....	.31	.62	.94	1.25	1.56	1.87	¾	.....	1.22	2.45	3.67	4.9	6.12	7.34
3½	.....	.34	.68	1.01	1.35	1.69	2.03	¾	.....	1.25	2.5	3.75	5	6.25	7.5
4	.....	.36	.73	1.09	1.46	1.82	2.19	¾	.....	1.27	2.55	3.83	5.1	6.39	7.66
4½	.....	.39	.78	1.17	1.56	1.95	2.34	¾	.....	1.3	2.6	3.91	5.2	6.51	7.81
5	.....	.42	.83	1.25	1.67	2.08	2.5	¾	.....	1.32	2.66	3.98	5.3	6.64	7.97
5½	.....	.44	.88	1.33	1.77	2.21	2.65	¾	.....	1.35	2.7	4.06	5.41	6.77	8.13
6	.....	.47	.94	1.4	1.87	2.34	2.81	¾	.....	1.38	2.76	4.14	5.52	6.91	8.29
6½	.....	.5	.99	1.48	1.98	2.47	2.97	¾	.....	1.40	2.81	4.22	5.62	7.08	8.44
7	.....	.52	1.04	1.56	2.09	2.6	3.12	¾	.....	1.43	2.86	4.3	5.73	7.16	8.59
7½	.....	.55	1.09	1.64	2.19	2.73	3.23	¾	.....	1.46	2.92	4.37	5.83	7.29	8.75
8	.....	.57	1.14	1.72	2.29	2.86	3.44	¾	.....	1.51	3.02	4.53	6.04	7.55	9.07
8½	.....	.6	1.2	1.8	2.4	2.99	3.59	¾	.....	1.56	3.12	4.69	6.25	7.81	9.37
9	.....	.62	1.25	1.87	2.5	3.12	3.75	¾	.....	1.61	3.23	4.84	6.46	8.07	9.69
9½	.....	.65	1.3	1.95	2.6	3.26	3.91	¾	.....	1.67	3.33	5	6.67	8.33	10
10	.....	.68	1.35	2.03	2.7	3.38	4.06	¾	.....	1.72	3.43	5.16	6.87	8.6	10.3
10½	.....	.7	1.4	2.11	2.81	3.52	4.22	¾	.....	1.77	3.54	5.32	7.08	8.85	10.63
11	.....	.73	1.46	2.19	2.91	3.65	4.37	¾	.....	1.82	3.65	5.47	7.29	9.11	10.94
11½	.....	.76	1.51	2.27	3.02	3.73	4.53	¾	.....	1.87	3.75	5.62	7.5	9.37	11.25
12	.....	.78	1.56	2.34	3.12	3.91	4.69	¾	.....	1.93	3.85	5.78	7.71	9.63	11.56
12½	.....	.81	1.61	2.42	3.23	4.03	4.84	¾	.....	1.98	3.96	5.94	7.92	9.89	11.87
13	.....	.83	1.66	2.5	3.33	4.17	5.00	¾	.....	2.03	4.06	6.09	8.12	10.15	12.19
13½	.....	.86	1.72	2.58	3.44	4.3	5.16	¾	.....	2.08	4.17	6.25	8.33	10.4	12.5
14	.....	.88	1.77	2.66	3.54	4.43	5.31	¾	.....	2.13	4.27	6.4	8.54	10.67	12.8
14½	.....	.91	1.82	2.73	3.64	4.56	5.47	¾	.....	2.19	4.37	6.56	8.75	10.93	13.13
15	.....	.94	1.87	2.81	3.75	4.69	5.62	¾	.....	2.24	4.48	6.72	8.96	11.20	13.43
15½	.....	.96	1.93	2.89	3.85	4.82	5.78	¾	.....	2.29	4.58	6.87	9.16	11.45	13.75
16	.....	.99	1.98	2.97	3.96	4.95	5.94	¾	.....	2.34	4.69	7.03	9.37	11.72	14.06
16½	.....	1.01	2.03	3.05	4.06	5.08	6.1	¾	.....	2.39	4.79	7.18	9.58	11.97	14.37	
17	.....	1.04	2.08	3.12	4.17	5.21	6.25	¾	.....	2.45	4.89	7.34	9.79	12.25	14.69	
17½	.....	1.06	2.13	3.2	4.27	5.34	6.41	¾	.....	2.5	5	7.5	10	12.5	15	
18	.....	1.1	2.19	3.28	4.37	5.47	6.56	¾	.....	.....	.....	.....	.....	.....	.....

HOPKINS' HANDY NOTES AND QUERIES.

Weight of Flat Iron—Continued.

WEIGHT OF RUNNING FOOT IN POUNDS.

Width in Inches.	Thickness in Inches.					Width in Inches.	Thickness in Inches.				
	7-16	1-2	5-8	3-4	7-8		7-16	1-2	5-8	3-4	7-8
1	1.46	1.67	2.08	2.5	2.92	5 3/4	7.84	8.96	11.2	13.43	15.68
1/4	1.64	1.87	2.34	2.81	3.28	3/4	8.02	9.17	11.45	13.75	16.03
1/2	1.92	2.08	2.6	3.12	3.65	1	8.2	9.37	11.72	14.07	16.4
3/4	2.01	2.29	2.86	3.44	4.01	1 1/4	8.39	9.58	11.99	14.37	16.77
1	2.19	2.5	3.12	3.75	4.37	1 1/2	8.57	9.79	12.25	14.7	17.13
1 1/4	2.37	2.71	3.38	4.06	4.74	1 3/4	8.75	10	12.5	15	17.5
1 1/2	2.55	2.92	3.64	4.37	5.1	2	8.93	10.2	12.77	15.3	17.85
1 3/4	2.73	3.12	3.9	4.69	5.47	2 1/4	9.11	10.42	13.02	15.62	18.2
2	2.92	3.33	4.16	5	5.83	2 1/2	9.3	10.63	13.29	15.93	18.6
2 1/4	3.1	3.54	4.43	5.31	6.2	2 3/4	9.48	10.83	13.53	16.25	18.97
2 1/2	3.28	3.75	4.69	5.62	6.56	3	9.67	11.03	13.81	16.57	19.33
2 3/4	3.46	3.96	4.95	5.94	6.93	3 1/4	9.84	11.25	14.05	16.87	19.7
3	3.65	4.17	5.21	6.25	7.29	3 1/2	10.02	11.45	14.32	17.19	20.03
3 1/4	3.83	4.37	5.47	6.56	7.66	3 3/4	10.2	11.65	14.59	17.5	20.42
3 1/2	4.01	4.58	5.73	6.88	8.02	4	10.59	12.09	15.1	18.13	21.15
3 3/4	4.19	4.79	5.99	7.19	8.39	4 1/4	10.93	12.5	15.62	18.73	21.85
4	4.37	5	6.25	7.5	8.75	4 1/2	11.31	12.92	16.15	19.39	22.62
4 1/4	4.56	5.21	6.51	7.82	9.12	4 3/4	11.66	13.33	16.65	20	23.33
4 1/2	4.74	5.42	6.77	8.12	9.48	5	12.03	13.75	17.18	20.6	24.05
4 3/4	4.92	5.63	7.03	8.44	9.84	5 1/4	12.4	14.17	17.7	21.25	24.8
5	5.1	5.83	7.29	8.75	10.21	5 1/2	12.76	14.58	18.23	21.89	25.52
5 1/4	5.29	6.04	7.55	9.07	10.59	5 3/4	13.12	15	18.75	22.5	26.23
5 1/2	5.47	6.25	7.81	9.37	10.93	6	13.5	15.42	19.27	23.12	26.95
5 3/4	5.65	6.46	8.07	9.68	11.3	6 1/4	13.85	15.83	19.78	23.73	27.7
6	5.83	6.67	8.33	10	11.65	6 1/2	14.2	16.25	20.32	24.35	28.42
6 1/4	6.02	6.87	8.59	10.3	12.04	6 3/4	14.59	16.65	20.83	25	29.15
6 1/2	6.2	7.08	8.85	10.62	12.4	7	14.93	17.08	21.32	25.62	29.83
6 3/4	6.38	7.29	9.11	10.93	12.75	7 1/4	15.3	17.5	21.89	26.25	30.62
6 1/2	6.56	7.5	9.37	11.25	13.12	7 1/2	15.67	17.92	22.4	26.85	31.33
6 3/4	6.74	7.71	9.64	11.55	13.5	7 3/4	16.03	18.33	22.9	27.5	32.08
7	6.93	7.92	9.89	11.87	13.85	8	16.4	18.75	23.43	28.12	32.8
7 1/4	7.11	8.12	10.15	12.2	14.22	8 1/4	16.75	19.15	23.93	28.73	33.52
7 1/2	7.29	8.33	10.42	12.5	14.59	8 1/2	17.13	19.59	24.49	29.35	34.25
7 3/4	7.48	8.54	10.69	12.8	14.95	8 3/4	17.5	20	25	30	35
8	7.66	8.75	10.93	13.13	15.3	9	.....	.....	.....	.....	.....

HOPKINS' HANDY NOTES AND QUERIES.

FLAT IRON.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

Size.				Feet in Bundle.	Size.				Feet in Bundle.
$\frac{1}{8}$	by	$\frac{1}{4}$	inch.....	267	$\frac{3}{8}$	by	$\frac{1}{4}$	inch.....	155
$\frac{1}{8}$	"	5-16	"	216	$\frac{3}{8}$	"	5-16	"	122
$\frac{1}{8}$	"	$\frac{3}{8}$	"	175	$\frac{3}{8}$	"	$\frac{3}{8}$	"	100
$\frac{1}{8}$	"	$\frac{1}{2}$	"	214	$\frac{3}{8}$	"	7-16	"	90
$\frac{1}{8}$	"	5-16	"	170	$\frac{3}{8}$	"	$\frac{1}{2}$	"	75
$\frac{1}{8}$	"	$\frac{3}{8}$	"	145	$\frac{3}{8}$	"	$\frac{3}{8}$	"	60
$\frac{1}{8}$	"	$\frac{1}{2}$	"	106	1	"	$\frac{1}{4}$	"	135
$\frac{1}{8}$	"	$\frac{1}{2}$	"	175	1	"	5-16	"	106
$\frac{1}{8}$	"	5-16	"	142	1	"	$\frac{3}{8}$	"	90
$\frac{1}{8}$	"	$\frac{3}{8}$	"	120	1	"	7-16	"	78
$\frac{1}{8}$	"	7-16	"	103	1	"	$\frac{1}{2}$	"	65
$\frac{1}{8}$	"	$\frac{1}{2}$	"	90	1	"	9-16	"	60
$\frac{1}{8}$	"	$\frac{3}{8}$	"	70	1	"	$\frac{3}{8}$	"	52

Round and Square Iron.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

ROUND IRON.				SQUARE IRON.			
Size.		Feet in Bundle.		Size.		Feet in Bundle.	
3-16	inch.....	1115		3-16	inch.....	953	
$\frac{1}{4}$	"	688		$\frac{1}{4}$	"	540	
5-16	"	440		5-16	"	345	
$\frac{3}{8}$	"	305		$\frac{3}{8}$	"	240	
7-16	"	225		7-16	"	176	
$\frac{1}{2}$	"	170		$\frac{1}{2}$	"	135	
9-16	"	136		9-16	"	107	
$\frac{5}{8}$	"	110		$\frac{5}{8}$	"	87	
11-16	"	90		11-16	"	70	
$\frac{3}{4}$	"	75		$\frac{3}{4}$	"	60	

Round Bar Iron.

WEIGHT OF A RUNNING FOOT IN POUNDS.

Diam. Inch.	Wt. per foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.
1-16	.01	1 1-16	2.975	2 $\frac{1}{8}$	11.9	4 $\frac{1}{8}$	44.85
$\frac{1}{8}$	.0411	$\frac{1}{8}$	3.338	$\frac{1}{4}$	13.3	$\frac{1}{4}$	47.54
3-16	.0923	3-16	3.725	$\frac{3}{8}$	14.75	$\frac{3}{8}$	50.33
$\frac{1}{4}$	.1651	$\frac{1}{4}$	4.12	$\frac{1}{2}$	16.4	$\frac{1}{2}$	53.32
5-16	.2573	5-16	4.545	$\frac{3}{8}$	18.1	$\frac{3}{8}$	56.34
$\frac{3}{8}$	.371	$\frac{3}{8}$	5.	$\frac{1}{2}$	19.85	$\frac{1}{2}$	59.44
7-16	.503	7-16	5.453	$\frac{3}{8}$	21.5	$\frac{3}{8}$	62.62
$\frac{1}{2}$	.657	$\frac{1}{2}$	5.945	3	23.7	5	65.83
9-16	.835	9-16	6.445	$\frac{1}{2}$	25.55	$\frac{1}{2}$	69.23
$\frac{5}{8}$	1.031	$\frac{5}{8}$	6.975	$\frac{3}{4}$	27.81	$\frac{3}{4}$	72.65
11-16	1.235	11-16	7.52	$\frac{1}{2}$	29.85	$\frac{3}{8}$	76.18
$\frac{3}{4}$	1.475	$\frac{3}{4}$	8.05	$\frac{3}{8}$	32.25	$\frac{1}{2}$	79.75
13-16	1.74	13-16	8.65	$\frac{1}{2}$	34.45	$\frac{5}{8}$	83.45
$\frac{7}{8}$	2.015	$\frac{7}{8}$	9.25	$\frac{1}{2}$	37.1	$\frac{1}{2}$	87.20
15-16	2.317	15-16	9.9	$\frac{3}{8}$	39.5	$\frac{3}{8}$	91.60
1	2.625	2	10.55	4	41.95	6	95.

FOR STEEL multiply tabular number above (for size) 1.01.

HOPKINS' HANDY NOTES AND QUERIES.

SQUARE BAR IRON.

WEIGHT OF A RUNNING FOOT, IN POUNDS.

Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.
1-16	.0131	1 1-16	3.80	2 1-8	15.15	4 1-8	57.20
1-8	.0525	1-8	4.25	1-4	17.	1-4	60.75
3-16	.1182	3-16	4.73	3-8	18.5	3-8	64.35
1-4	.2103	1-4	5.25	1-2	25.5	1-2	68.
5-16	.3200	5-16	5.73	5-8	23.1	5-8	72.
3-8	.4735	3-8	6.35	3-4	25.2	3-4	75.65
7-16	.6445	7-16	6.95	7-8	27.5	7-8	79.80
1-2	.84	1-2	7.55	3	30.05	5	83.8
9-16	1.063	9-16	8.2	1-8	32.75	1-8	88.25
5-8	1.314	5-8	8.85	1-4	35.5	1-4	92.5
11-16	1.59	11-16	9.57	3-8	38.25	3-8	97.15
3-4	1.85	3-4	10.30	1-2	41.15	1-2	101.
13-16	2.221	13-16	11.05	5-8	44.15	5-8	105.8
7-8	2.575	7-8	11.83	3-4	47.20	3-4	110.5
15-16	2.95	15-16	12.62	7-8	50.25	7-8	115.15
1	3.35	2	13.4	4	53.75	6	120.25

FOR STEEL multiply tabular number above (for size) by 1.01.

BAND IRON.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

Size.		Feet in Bundle.	Size.		Feet in Bundle.
Width.	Thick.		Width.	Thick.	
1 1/8 inches.	No. 12	265	2 1/8 inches.	No. 12	110
1 1/8 "	" 10	213	2 1/8 "	" 10	88
1 1/8 "	" 7	160	2 1/8 "	" 8	72
1 1/4 "	" 12	246	2 1/4 "	" 6	60
1 1/4 "	" 10	190	3 "	" 12	101
1 1/4 "	" 7	145	3 "	" 10	80
1 1/2 "	" 12	205	3 "	" 8	66
1 1/2 "	" 10	160	3 "	" 6	57
1 1/2 "	" 7	120	3 1/4 "	" 10	75
1 3/4 "	" 12	175	3 1/4 "	" 8	60
1 3/4 "	" 10	139	3 1/4 "	" 6	50
1 3/4 "	" 8	110	3 1/2 "	" 10	69
1 3/4 "	" 7	100	3 1/2 "	" 8	57
2 "	" 12	155	3 1/2 "	" 6	48
2 "	" 10	120	4 "	" 10	60
2 "	" 8	99	4 "	" 8	50
2 "	" 7	90	4 "	" 6	40
2 "	" 6	81	4 1/4 "	" 10	52
2 1/4 "	" 12	135	4 1/4 "	" 8	43
2 1/4 "	" 10	105	4 1/4 "	" 6	35
2 1/4 "	" 8	88	5 "	" 10	48
2 1/4 "	" 6	72	5 "	" 8	40
2 1/2 "	" 12	120	5 "	" 6	34
2 1/2 "	" 10	95	6 "	" 10	40
2 1/2 "	" 8	77	6 "	" 8	32
2 1/2 "	" 6	65	6 "	" 6	26

HOPKINS' HANDY NOTES AND QUERIES.

Weight of Tire Iron,

PER SET OF 54 FEET.

Size.	Lbs.	Size.	Lbs.	Size.	Lbs.
1 by 3-16	34	1 1-4 by 1-4	56	1 1-2 by 5-8	169
1 by 1-4	45	1 1-4 by 5-16	70	1 5-8 by 1-2	148
1 by 5-16	56	1 1-4 by 3-8	85	1 5-8 by 5-8	143
1 by 3-8	68	1 1-4 by 7-16	99	1 3-4 by 1-2	158
1 1-8 by 1-4	50	1 1-4 by 1-2	113	1 3-4 by 5-8	197
1 1-8 by 5-16	63	1 3-8 by 3-8	93	1 3-4 by 3-4	236
1 1-8 by 3-8	75	1 3-8 by 1-2	124	2 by 1-2	180
1 1-8 by 7-16	88	1 1-2 by 3-8	101	2 by 5-8	225
1 1-8 by 1-2	101	1 1-2 by 1-2	135	2 by 3-4	270

Railroad Spikes.

NUMBER IN 100 POUNDS.

Thickness	Length.									
	3	4	5	6	7	8	9	10	12	14
1-4	1340	1060	870	680						
5-16		620	580	540						
3-8			460	380	320	290	250			
7-16			320	280	240	220	200			
1-2			260	210	180	170	140	130	110	
5-8			170	130			100	90	80	70

Wrought Boat and Ship Spikes.

NUMBER IN A KEG OF 150 POUNDS.

Thickness	Length.													
	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½
1-4	1910	1585	1326	1223	1025									
5-16	1010	963	810	605	583		521							
7-16			642	503	461	423	402	321						
1-2					340	312	298	280	261	240	223			
9-16							221	200	190	180	170	160	150	140
5-8											140	130	120	110

HOPKINS' HANDY NOTES AND QUERIES.

Weight of Sheet and Plate Iron.

THICKNESS BY BIRMINGHAM WIRE GAUGE AND INCHES, WEIGHT OF A SQUARE FOOT IN POUNDS.

THICKNESS.			THICKNESS.		
B. W. Gauge.	Part of an inch.	Weight Pounds.	B. W. Gauge.	Part of an inch.	Weight Pounds.
36	.004	.126	11	.120	4.48
35	.005	.202		$\frac{1}{8}$ or .125	5.054
34	.007	.283	10	.134	5.426
33	.008	.322	9	.148	5.98
32	.009	.364		5-32 or .1562	6.305
31	.010	.405	8	.165	6.605
30	.012	.485	7	.180	7.27
29	.013	.526		3-16 or .1875	7.578
28	.014	.595	6	.203	8.005
27	.016	.677		7-32 or .2187	8.79
26	.018	.755	5	.22	8.912
25	.020	.811	4	.238	9.62
24	.022	.912		$\frac{1}{4}$ or .25	10.09
23	.025	1.018	3	.259	10.437
22	.028	1.137		9-32 or .2812	11.38
	1-32 or .03125	1.259	2	.284	11.525
21	.032	1.31	1	.3	12.15
20	.035	1.416		5.16 or .3525	12.58
19	.042	1.695	0	.340	13.750
18	.049	1.075		11-32 or .3437	13.875
17	.058	2.35		$\frac{3}{8}$ or .375	15.10
16	.065	2.637	00	.380	15.26
	1-16 or .0625	2.518		13-32 or .4062	16.34
15	.072	2.92	000	.425	17.125
14	.083	3.35		8-16 or .4375	17.65
	3-32 or .0937	3.78	0000	.454	18.30
13	.095	3.85		15-32 or .4607	18.90
12	.100	4.4	00000	$\frac{1}{2}$ or .50	20.20

Weight of Sheet and Plate Iron.

THICKNESS IN INCHES. WEIGHT OF A SQUARE FOOT IN POUNDS.

Inches Thick.	Lbs. per Square Foot	Inches Thick.	Lbs. per Square Foot	Inches Thick.	Lbs. per Square Foot.
9-16	22.5	1 $\frac{1}{4}$	70.62	3 $\frac{1}{8}$	156.51
$\frac{5}{8}$	25.21	13-16	73.14	4	161.55
11-16	27.75	$\frac{1}{2}$	75.53	$\frac{1}{8}$	166.6
$\frac{3}{4}$	30.25	15-16	78.20	$\frac{1}{4}$	171.76
13-16	32.75	2	80.75	$\frac{3}{8}$	176.71
$\frac{7}{8}$	35.26	$\frac{1}{8}$	85.75	$\frac{1}{2}$	181.77
15-16	37.75	$\frac{3}{8}$	90.81	$\frac{5}{8}$	186.79
1	40.35	$\frac{1}{2}$	95.86	$\frac{3}{4}$	191.84
1-16	42.87	$\frac{5}{8}$	100.9	$\frac{7}{8}$	196.9
$\frac{1}{8}$	45.4	$\frac{1}{2}$	105.95	5	201.85
3-16	47.9	$\frac{3}{4}$	111.	$\frac{1}{8}$	206.9
$\frac{1}{4}$	50.45	$\frac{1}{2}$	116.1	$\frac{1}{4}$	211.95
5-16	52.96	3	121.15	$\frac{1}{2}$	217
$\frac{3}{8}$	55.45	$\frac{1}{8}$	126.21	$\frac{3}{8}$	222.05
7-16	58.01	$\frac{1}{4}$	131.26	$\frac{1}{2}$	227.01
$\frac{1}{2}$	60.52	$\frac{3}{8}$	136.32	$\frac{3}{4}$	232.15
9-16	63.05	$\frac{1}{2}$	141.37	$\frac{7}{8}$	237.2
$\frac{5}{8}$	65.56	$\frac{3}{8}$	146.41	6	242.25
11-16	68.11	$\frac{1}{2}$	151.46		

For STEEL PLATES multiply tabular numbers above (for Size) by 1.01.

HOPKINS' HANDY NOTES AND QUERIES.

Weight and Thickness of Boiler Iron.

1-8 inch weighs 5 lbs. per sq. ft.	No. 1 Iron is...5-16 inch thick.
3-16 " " 7½ " "	No. 3 " ...9-32 " "
1-4 " " 10 " "	No. 4 " ...1-4 " "
5-16 " " 12½ " "	No. 5 " ...7-32 " "
3-8 " " 15 " "	No. 7 " ...3-16 " "
7-16 " " 17½ " "	
1-2 " " 20 " "	

Thickness of Boiler Iron Required

AND PRESSURES ALLOWED BY THE LAWS OF THE UNITED STATES.

Pressure equivalent to the Standard for a Boiler 42-in. in diameter and $\frac{1}{4}$ in thickness.

Thickness in 16ths.	Diameter in inches.						
	34	36	38	40	42	44	46
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
5	169.9	160.4	152.	144.4	137.5	131.2	125.5
4½	158.5	149.7	141.8	134.7	128.3	122.5	117.2
4¼	147.2	139.1	131.8	125.1	119.2	113.7	108.8
4	135.9	128.3	121.6	115.5	110.	105	100.
3¾	124.5	117.6	111.3	105.9	100.8	96.2	92.
3½	113.2	106.9	101.3	96.2	91.7	87.5	83..
3	101.9	96.2	91.2	82.6	82.5	78.7	75..

Number of Burden's Rivets in 100 Lbs.

Length, Inches.	Thickness in inches.				Length, Inches.	Thickness in inches.			
	1-2	5-8	11-16	3-4		1-2	5-8	11-16	3-4
¾	1,092	665			3¼	433	267	212	180
¾	1,027	597			3½	413	248	201	169
1	940	538	450		3¾	395	241	192	160
1¼	840	512	415		4		230	184	158
1½	797	487	389	356	4½		220	177	150
1¾	760	460	370	329	5		210	171	146
2	730	440	357	280	5½		200	166	138
2¼	711	420	340	271	6		190	161	135
2½	693	390	325	262	6¼		180	156	130
2¾	648	375	312	257	6½		172	151	124
3	608	360	297	243	6¾		164	145	120
3¼	573	354	289	237	7		157	140	115
3½	555	347	280	232			150	138	111
3¾	525	335	260	220			146	134	107
4	500	312	242	208			143	129	104
	460	290	224	197			140	125	100

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HOPKINS HANDY NOTES AND QUERIES.

BROWNING, SISUM & CO.,

No. 85 CHAMBERS ST., NEW YORK,

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Hardware Specialties,

COTTER'S SPRING KEYS,

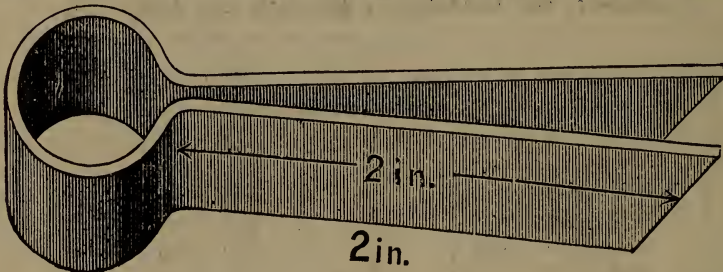
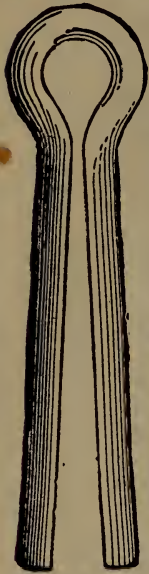
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In fact everything appertaining to

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HOPKINS' HANDY NOTES AND QUERIES.

Spring Cotters and Keys and their Applications.

SPRING COTTERS.

No	30	31	32	33	34	35	36	37	39	39
Wire Gauge..	13	13	11	11	7	7	4	4	1	1
For Hole.....	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$
For Nuts.....	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$

SPRING KEYS.

No	000	00	0	1	$1\frac{1}{2}$	2	3	4
Wire Gauge.....	12	12	12	11	11	10	10	10
For Hole.....	$\frac{7}{32}$	$\frac{7}{32}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{9}{32}$	$\frac{9}{32}$	$\frac{9}{32}$
For Bolts.....	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	1

Machine Bolts with Square Heads and Nuts.

WEIGHT OF 100, IN POUNDS.

Length. Inches.	Thickness of Bolt in Inches.							
	$\frac{1}{4}$	5-16	$\frac{3}{8}$	7-16	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
$1\frac{1}{2}$	4.16	7.59	10.62	15.94	23.87	39.31	....	....
$\frac{3}{4}$	4.22	7.87	11.72	16.90	25.06	41.38	....	....
2	4.75	8.56	12.38	18.25	26.44	45.69	73.62	....
$\frac{1}{4}$	5.34	9.12	12.90	19.38	28.62	49.50	76.	....
$\frac{1}{2}$	5.97	9.59	14.69	20.69	29.50	51.25	79.75	....
$\frac{3}{4}$	6.50	10.44	16.47	21.50	31.16	53.	83.	....
3	....	10.78	17.87	22.38	32.44	56.	85.38	127.25
$\frac{1}{2}$	....	11.81	18.94	26.19	39.75	63.12	93.44	140.56
4	....	....	20.59	28.87	42.50	74.87	108.12	143.37
$\frac{1}{2}$	....	....	21.69	29.87	44.87	79.62	113.12	153.76
5	....	....	23.62	32.31	45.81	83.	122.	167.25
$\frac{1}{2}$	....	....	25.81	34.44	51.38	87.88	128.62	174.88
6	....	....	26.87	36.62	53.31	92.38	131.75	204.25
$\frac{1}{2}$	....	....	....	....	56.87	96.88	139.56	214.69
7	....	....	....	....	59.12	99.87	145.50	223.44
$\frac{1}{2}$	....	....	....	....	61.87	105.75	150.88	235.31
8	....	....	....	....	64.44	109.50	157.12	248.88
9	....	....	....	....	70.50	118.12	169.92	258.12
10	....	....	....	....	77.	128.13	184.	276.18
11	....	....	....	....	82.88	136.19	195.13	295.69
12	....	....	....	....	86.37	144.87	209.75	311.94
13	....	....	....	....	92.	155.52	219.37	335.81
14	....	....	....	....	97.75	163.59	337.50	351.89
15	....	....	....	....	103.25	170.75	349.05	391.75

HOPKINS' HANDY NOTES AND QUERIES.

Tempering Steel.

(Haswell.)

Steel in its hardest state being too brittle for most purposes, the requisite strength and elasticity are obtained by tempering—or *letting down the temper* as it is termed—which is performed by heating the hardened steel to a certain degree and cooling it quickly. The requisite heat is usually ascertained by the color which the surface of the Steel assumes from the film of oxide thus formed.

The degrees of heat to which these several colors correspond are as follows:

At 430, a very faint yellow.	{ Suitable for hard instruments ; as hammer-
At 450, a pale straw color.	{ faces, drills, &c.
At 470, a full yellow.....	{ For instruments requiring hard edges without
At 490, a brown color.....	{ elasticity; as shears, scissors, turning tools, &c
At 510, brown, with purple spots.....	{ For tools, for cutting wood and soft metals ;
At 530, purple.....	{ such as plane-irons, knives, &c.
At 550, dark blue.....	{ For tools requiring strong edges, without ex-
At 560, full blue.....	{ treme hardness ; as cold-chisels, axes, cut-
	{ lery, &c.
At 600, grayish blue, verg-	{ For spring-temper, which will bend before
ing on black.....	{ breaking ; as saws, sword-blades, &c.

If the steel is heated higher than this, the effect of the hardening process is destroyed.

It Has Been Stated

That the temperature of furnaces &c., may be estimated with considerable accuracy by the color of the fire, and that with a little practice the error at very high temperatures will not exceed 90°, or 100°, and the following table contains the result of observations with an air thermometer.

Color of Fire.	Temperature, Degrees F.	Color of Fire.	Temperature, degrees F.
Red, just visible.....	977	Orange, deep.....	2,010
“ dull.....	1,290	“ clear.....	2,190
“ cherry, dull.....	1,470	White heat.....	2,370
“ “ full.....	1,650	“ bright.....	2,550
“ “ clear.....	1,830	“ dazzling.....	2,730

Effect of Heat on Various Bodies.

	Degrees		Degrees.
Ammonia boils.....	140	Iron, bright red in the dark...	752
Ammonia (liquid) freezes.....	-46	“ red hot in twilight.....	884
Antimony melts.....	951	Lead melts.....	504
Arsenic melts.....	365	Mercury boils.....	662
Bismuth melts.....	476	“ volatilizes.....	680
Blood (human) heat of.....	98	“ freezes.....	-39
“ “ freezes.....	25	Naphtha boils.....	1-6
Brandy freezes.....	-7	Petroleum boils.....	306
Brass melts.....	1,900	Platinum melts.....	3,080
Cadmium melts.....	600	Potassium melts.....	135
Coal Tar boils.....	325	Proof Spirit freezes.....	-7
Cold, greatest artificial.....	-166	Saltpetre melts.....	600
“ greatest natural.....	-56	Sea-water freezes.....	28
Common Fire.....	790	Silver (fine) melts.....	1,250
Copper melts.....	2,548	Snow and Salt, equal parts.	0
Glass melts.....	2,377	Spirits of Turpentine freezes.	14
Gold (fine) melts.....	2,590	Steel melts.....	2,500
Gutta-percha softens.....	145	“ polished, blue.	580
Heat, cherry red.....	1,500	“ straw color.....	460
“ “ (Daniel).....	1,141	Strong Wines freeze.....	20
“ bright red.....	1,860	Sulphur melts.....	226
“ red, visible by day.....	1,077	Sulphuric Acid (sp. grav. 1.641) freezes	-45
“ white.....	2,900	Tin melts.....	421
Ice melts.....	32	Vinous fermentation.....	60 to 77
Iron (cast) melts.....	3,479	Water in <i>vacuo</i> boils.....	95
“ (wrought) melts.....	3,980	Zinc melts.....	740

The sign — before the figures indicates that many degrees below zero or 0.

HOPKINS' HANDY NOTES AND QUERIES.

Weight of a Lineal Foot of Flat Steel in lbs.

Inch.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
$\frac{1}{16}$	.213	.426	.64	...	...	...	..
$\frac{1}{8}$	.266	.533	.8	1.066	...	...	...
$\frac{3}{16}$	.319	.639	.959	1.28	1.6	...	...
$\frac{1}{4}$	.426	.853	1.28	1.706	2.133	2.559	...
$\frac{5}{16}$	.48	.959	1.439	1.919	2.399	2.879	3.84
$\frac{3}{8}$	.533	1.066	1.6	2.133	2.666	3.200	4.266
$\frac{7}{16}$	.586	1.173	1.759	2.346	2.933	3.519	4.693
$\frac{1}{2}$	.639	1.279	1.919	2.56	3.199	3.84	5.119
$\frac{9}{16}$	.693	1.386	2.079	2.773	3.466	4.16	5.546
$\frac{5}{8}$	.746	1.493	2.24	2.986	3.733	4.479	5.973
$\frac{11}{16}$	.853	1.706	2.559	3.413	4.266	5.119	6.826
$\frac{3}{4}$	.906	1.813	2.719	3.626	4.533	5.439	7.253
$\frac{13}{16}$	.96	1.919	2.879	3.84	4.799	5.76	7.68
$\frac{7}{8}$	1.013	2.026	3.039	4.053	5.066	6.079	8.106
$\frac{15}{16}$	1.016	2.133	3.199	4.266	5.333	6.399	8.533
1	1.019	2.24	3.36	4.48	5.6	6.72	8.96
$1\frac{1}{16}$	1.173	2.346	3.519	4.693	5.866	7.039	9.386
$1\frac{1}{8}$	1.28	2.56	3.84	5.12	6.4	7.68	10.24
$1\frac{1}{4}$	1.386	2.773	4.16	5.546	6.933	8.319	11.093
$1\frac{3}{8}$	1.493	2.986	4.48	5.973	7.466	8.95	11.946
$1\frac{1}{2}$	1.6	3.199	4.799	6.399	7.999	9.599	12.799
$1\frac{5}{8}$	1.706	3.413	5.119	6.826	8.533	10.239	13.653
$1\frac{3}{4}$	1.813	3.626	5.439	7.253	9.066	10.879	14.506
$1\frac{7}{8}$	1.92	3.84	5.76	7.68	9.6	11.52	15.36
2	2.026	4.053	6.079	8.106	10.133	12.159	16.213
$2\frac{1}{8}$	2.133	4.266	6.399	8.533	10.666	12.799	17.066
$2\frac{1}{4}$	2.24	4.48	6.72	8.959	11.199	13.44	17.919
$2\frac{3}{8}$	2.346	4.693	7.039	9.386	11.733	14.079	18.773
$2\frac{1}{2}$	2.453	4.906	7.359	9.813	12.266	14.719	19.626
$2\frac{5}{8}$	2.56	5.12	7.68	10.24	12.8	15.36	20.48

American Sizes of Sheet Iron.

The following table gives the pounds and ounces per square foot of plain and galvanized sheet-iron from No. 14 to No. 29, inclusive, and is the table upon which the current price lists of the rolling mills are based.

NUMBERS AND WEIGHTS OF SHEET IRON.

No.	Oz.	Lbs.	Oz.	No.	Oz.	Lbs.	Oz.
14.....	60	3	12	23.....	19	1	3
16.....	48	3	0	24.....	17	1	1
17.....	43	2	11	25.....	16	1	0
18.....	38	2	6	26.....	15		
19.....	33	2	1	27.....	14		
20.....	28	1	12	28.....	13		
21.....	24	1	8	29.....	12		
22.....	21	1	5				

HOPKINS' HANDY NOTES AND QUERIES.

Weight of one foot of Bar Steel.

ROUND.		SQUARE.		OCTAGON.	
Diam. In.	Lbs.	Side In.	Lbs.	Diam. In.	Lbs.
$\frac{1}{8}$	.166	$\frac{1}{8}$	.213	$\frac{1}{8}$	.84
$\frac{3}{16}$	.375	$\frac{3}{16}$	.479	$\frac{3}{16}$	1.23
$\frac{1}{4}$	.667	$\frac{1}{4}$	.855	$\frac{1}{4}$	1.75
$\frac{5}{16}$	1.04	$\frac{5}{16}$	1.33	$\frac{5}{16}$	2.25
$\frac{3}{8}$	1.50	$\frac{3}{8}$	1.91	$\frac{3}{8}$	2.75
$\frac{7}{16}$	2.05	$\frac{7}{16}$	2.61	1	3.66
1	2.67	1	3.40	$1\frac{1}{8}$	4.55
$1\frac{1}{8}$	3.38	$1\frac{1}{8}$	4.34	$1\frac{1}{4}$	5.50
$1\frac{1}{4}$	4.17	$1\frac{1}{4}$	5.32	$1\frac{3}{8}$	6.45
$1\frac{3}{8}$	5.05	$1\frac{3}{8}$	6.44	$1\frac{1}{2}$	7.75
$1\frac{1}{2}$	6.00	$1\frac{1}{2}$	7.67	$1\frac{5}{8}$	9.20
$1\frac{5}{8}$	7.05	$1\frac{5}{8}$	9.00	$1\frac{3}{4}$	10.04
$1\frac{3}{4}$	8.17	$1\frac{3}{4}$	10.44	2	11.60
$1\frac{7}{8}$	9.38	$1\frac{7}{8}$	11.98	$2\frac{1}{8}$	13.14
2	10.68	2	13.63	$2\frac{1}{4}$	14.75
$2\frac{1}{8}$	12.04	$2\frac{1}{8}$	15.35	$2\frac{1}{2}$	16.40
$2\frac{1}{4}$	13.51	$2\frac{1}{4}$	17.20	$2\frac{3}{8}$	17.85
$2\frac{3}{8}$	15.05	$2\frac{3}{8}$	19.17	$2\frac{1}{2}$	19.50
$2\frac{1}{2}$	16.68	$2\frac{1}{2}$	21.20	$2\frac{5}{8}$	21.25
$2\frac{5}{8}$	18.43	$2\frac{5}{8}$	23.30	$2\frac{3}{4}$	22.69
$2\frac{3}{4}$	20.19	$2\frac{3}{4}$	25.70	3	25.00
$2\frac{7}{8}$	22.00	$2\frac{7}{8}$	27.74		
3	24.03	3	30.60		
$3\frac{1}{8}$	26.12	$3\frac{1}{8}$	33.18		
$3\frac{1}{4}$	28.20	$3\frac{1}{4}$	35.90		
$3\frac{3}{8}$	30.45	$3\frac{3}{8}$	38.78		
$3\frac{1}{2}$	32.70	$3\frac{1}{2}$	41.65		
$3\frac{5}{8}$	35.12	$3\frac{5}{8}$	44.17		
$3\frac{3}{4}$	37.54	$3\frac{3}{4}$	46.70		
4	42.71	4	54.40		
$4\frac{1}{4}$	48.22	$4\frac{1}{4}$	61.40		
$4\frac{3}{4}$	54.06	$4\frac{3}{4}$	68.85		
5	66.75	5	85.00		

American and Birmingham Wire Gauges.

Thickness in Inches. (Taken from Haswell.)

No. of Gauge.	Thick. of Am. G.	Thick. of Bir. G.	No. of Gauge.	Thick. of Am. G.	Thick. of Bir. G.	No. of Gauge.	Thick. of Am. G.	Thick. of Bir. G.
	Inch.	Inch.		Inch.	Inch.		Inch.	Inch.
0000	.46	.454	11	.0907	.12	25	.0179	.02
000	.4096	.425	12	.0808	.109	26	.0160	.018
00	.3648	.38	13	.0719	.095	27	.0142	.016
0	.3248	.34	14	.0641	.083	28	.0126	.014
1	.2893	.30	15	.057	.072	29	.0112	.013
2	.2576	.284	16	.0508	.065	30	.01	.012
3	.2294	.259	17	.0452	.058	31	.0089	.1
4	.2043	.238	18	.0403	.049	32	.0079	.009
5	.1819	.22	19	.0359	.042	33	.007	.008
6	.1620	.203	20	.0319	.035	34	.0063	.007
7	.1443	.18	21	.0284	.032	35	.0056	.005
8	.1285	.165	22	.0253	.028	36	.005	.004
9	.1144	.148	23	.0225	.025			
10	.1019	.134	24	.0201	.022			

HOPKINS' HANDY NOTES AND QUERIES.

Specific Gravity, and Weight

TO CUBIC FOOT OF VARIOUS MATERIALS.

TIMBER.	Specific gravity.		FLUIDS.	Specific gravity.		STONES, EARTHS, &c.	Specific gravity.	
	Weight per cub. foot in pounds.			Weight per cub. foot.			Weight per cub. foot in pounds.	
Ash.....	.8	50	Alcohol.....	.8	50	Chalk.....	2.3	243
Beech.....	.69	43	Ether.....	.74	46	Clay.....	2.	125
Birch.....	.71	44	Oil.....	.90	56	Coal.....	1.3	82
Cedar.....	.48	31	Water,			Coke.....	.8	50
Deal, Christ'na	.7	44	Fresh.....	1.000	62.4	Earth,		
Elm.....	.6	37	Water, Sea..	1.028	64.1	Rammed.	1.6	100
Hornbeam....	.75	47	<i>Artificial Substances.</i>			Flint.....	2.6	163
Larch.....	.55	35				Gravel.....	1.9	120
Memel.....	.6	37	Brick.....	2.0	124	Granite....	2.6	164
Mahogany,			Brickwork,			Grindstone.	2.1	131
Spanish.....	.8	50	in mortar..	1.6	100	Limestone..	2.5	156
Oak, English..	.93	53	Brickwork,			Marble....	2.7	168
Oak, Canadian	.87	54	in cement..	1.8	112	Sand.....	1.9	120
Pine, Red.....	.65	41	Concrete,			Sandstone..	2.5	156
Pine, Yellow..	.45	29	ordinary... 1.9	119		Stone,		
Teak, Moulm'n	.65	41	in cement.. 2.2	133		Bath.....	1.8	112
Yew.....	.8	50	Cement,			Stone,		
<i>Miscellaneous.</i>			Portland... 1.3	81		Portland..	2.1	131
			Roman.... 1.	63		York Flag..	2.3	143
			Glass..... 2.5	156		Slate.....	2.8	175
Asphaltum....	.9	56	Lime, quick. .8	50		Shingle....	1.4	90
Gutta Percha.	.98	61	Mortar..... 1.7	106				
India Rubber .	.94	60	Tile.....	1.8	112			
Ivory.....	1.8	112						

Weight of a Cubic Foot of Various Substances,

IN POUNDS.

METALS.	WOOD, &c.
Brass..... 430.	Live Oak..... 66.75
Gun Metal..... 513.	Hickory..... 95.5
Copper..... 545.	Pine, White..... 34.
Cast Iron..... 450.	Spruce..... 31.25
Wrought Iron..... 482.	Corkwood..... 15.
Lead..... 710.	Fire Brick..... 137.
Mercury..... 849.	Coal, Anthracite. 93.
Steel..... 486.	“ Bituminous 80.
“ Plates..... 452.	
Tin..... 455.	Coal, Cannel..... 94.
Zinc, Cast..... 428.	Cotton, Bale..... 14.
“ Rolled..... 460.	“ Pressed.. 22.
	Earth, Loose..... 94.
	“ Mud..... 102.
	Common Soil..... 137.
	Hay, Bale..... 9.5
	“ Pressed..... 25.

HOPKINS' HANDY NOTES AND QUERIES.

WORKSHOP RECIPES--CEMENTS FOR IRON.

To Mend Iron Pots.

Take two parts sulphur, and one part, by weight, of fine black lead; put the sulphur in an old iron pan, holding it over the fire until it begins to melt, then add the lead; stir well until all is melted; then pour out on an iron plate or smooth stone. When cool, break into small pieces. A sufficient quantity of this compound being placed upon the crack of the iron pot to be mended, can be soldered by a hot iron in the same way that a tinsmith solders his sheets. If there is a small hole in the pot, drive a copper rivet in it and then solder it with this cement.

Cement for Annealing Boxes.

Iron filings, 100 parts; lime milk, 40; quartz sand, 50; vinegar, 20. These are worked with water into a paste to which may be added, to render the mass more porous, hair, sawdust, etc.

Iron Cement for Hermetically Closing Stove Doors.

Finest iron filings, 100 parts; sal ammoniac, 10; limestone, 10; soluble glass solution, 10. These are mixed with water to a thick paste, which is applied at once, and is left to dry slowly before heating.

Cement for Broken Iron Vessels.

Iron filings, 10 parts; clay, 60. These are worked with linseed oil into a thick paste, which is applied after some more linseed oil has been added to it, and left to dry slowly.

Rust Cement for Iron.

Wrought-iron filings, 65 parts; sal ammoniac, $2\frac{1}{2}$; sulphur (flour), $1\frac{1}{2}$; sulphuric acid, 1. The solid ingredients are mixed dry, sulphuric acid diluted with sufficient water being then added. This cement dries after two or three days, and unites with the iron, making a very resisting and solid mass.

Cement for Filling Faults in Castings.

Iron filings, free from rust, 10 parts; sulphur, $\frac{1}{2}$; sal ammoniac, 0.8. These are mixed with water to a thick paste, which is rammed into the "faults." This becomes strong when the iron filings are rusted. The parts which have to be cemented are treated before the operation with liquid ammonia, so as to be perfectly free from grease.

Fire-Proof Cement.

(1) Iron filings, 140 parts; hydraulic lime, 20; quartz sand, 25; sal ammoniac, 3. These are formed into a paste with vinegar, and then applied. This cement is left to dry slowly before heating. (2) Iron filings, 180 parts; lime, 45; common salt, 8. These are worked into a paste with strong vinegar. The cement must be perfectly dry before heated. By heating it becomes stone-hard.

Iron Cement for High Temperatures.

(1) Iron filings, 20 parts; lime powder, 45; borax, 5; common salt, 5; permanganate of potash, 10. The borax and salts are dissolved in water, and are then mixed with the two first-named ingredients as quickly as possible and used. This cement changes at a white heat to a glassy mass, which is perfectly air-proof. (2) Permanganate, 25 parts; zinc white, 25; borax, 5. These are treated with a solution of soluble glass, and used at once. This cement must be left to dry slowly, and then it will resist the highest temperatures.

Cement for Gas Retorts.

For cementing earthenware gas retorts, which have to withstand very high temperatures, the following cement can be used: Powdered glass, 5 parts; chamotte meal, 5; powdered borax, 1. Chamotte meal is obtained by pulverizing broken pieces of gas retorts. This cement is a hard glass which only melts at the highest temperature, and then closes the leaks in the retort. To render the iron retort cover which closes the retort air-tight, a cement is used consisting of schwerspath powder, to which as much soluble glass has been mixed as to obtain a paste of sufficient strength.

HOPKINS' HANDY NOTES AND QUERIES.

WORKSHOP RECIPES.

Cement to Resist Fire and Water, and Harden Quickly.

Two parts finely sifted unoxidized iron filings.
One part, perfectly dry, finely powdered loam.
Knead the mixture with strong vinegar into a homogeneous plastic mass, to be used as soon as made.

To Soften Putty.

To remove old putty from broken windows, dip a small brush in nitromuriatic acid or caustic soda (concentrated lye), and with it annoint or paint over the dry putty that adheres to the broken glass and frames of your windows; after an hours interval, the putty will have become so soft as to be easily removable.

Painter's Putty.

Spanish whiting, pulverized.....	80.6	} Made into a stiff paste. If not intended for immediate use, raw oil should be used.
Boiled Oil.....	20.4	

One pound of putty for stopping every 20 yards.

Glazier's Putty.

Whiting, 70 pounds; boiled oil, 30 pounds; water, 2 gallons. Mix. If too thin add more whiting; if too thick, add more oil.

Cement for Stopping Joints, Etc.

White lead in oil, mixed with enough white sand to make it a stiff paste. This grows hard by exposure, and resists heat, cold and water.

Cement for Leather Belting.

Take of common glue and American isinglass, equal parts; place them in a boiler and add water sufficient to cover the whole. Let it soak 10 hours, then bring it to a boiling heat, and add pure tannin until the whole becomes rosey or appears like the whites of eggs. Apply it warm. Buff the grain off the leather where it is to be cemented; rub the joint surfaces solidly together, let it dry a few hours, and it is ready for practical use; and, if properly put together, it will not need riveting, as the cement is nearly of the same nature as the leather itself.

To Remove Rusty Bolts.

To remove bolts that have become rusted badly, without breaking them, is quite simple if understood. The best method is to apply kerosene oil liberally, and give time for it to soften the rust before any attempt is made to turn the nut. If, after the rust has softened, it does not start easily with the wrench, give a rap on one corner with a blow of the hammer. A hammer and cold chisel rightiy used will often start a rusted nut that would not yield to the wrench without twisting off the bolt.

How to Prepare Fence Posts.

A western farmer says that he discovered many years ago that wood could be made to last longer than iron in the ground. Time and weather, he says, seem to have no effect on it. Posts can be prepared for less than two cents apiece. This is the recipe: Take boiled linseed oil and stir it in pulverized charcoal to the consistency of paint. Put a coat of this over the timber, and, he adds, there is not a man that will live to see it rot.

A Practical Rule for Laying Pipe for Draining Land.

Soils.	Depth of Pipe,	Distance apart.
Coarse Gravel Sand.....	4 feet 6 inches.....	60 feet.
Light Sand with Gravel.....	4 ".....	50 "
Light Loam.....	3 " 6 ".....	33 "
Loam with Clay.....	3 " 2 ".....	21 "
" " Gravel.....	3 " 3 ".....	27 "
Sandy Loam.....	3 " 9 ".....	40 "
Soft Clay.....	2 " 9 ".....	21 "
Stiff ".....	2 " 6 ".....	15 "

Greatest Fall of Rain is 2 inches per hour=54303.6 galls. per acre.

A. B. & W. T. WESTERVELT,

102 Chambers Street,

Corner Church Street,

NEW YORK,

— MANUFACTURERS OF —

Ornamental Iron, Copper and Zinc Work.

COPPER WEATHER VANES AND BANNERETS,

NEWEST AND MOST APPROVED DESIGNS.

WROUGHT AND CAST IRON

RAILINGS.

DOOR AND WINDOW

GUARDS.

PLAIN AND ORNAMENTAL

Driveway Gates.

WIRE WORK

of every description for Banks,
Offices, &c.

Lamps AND Lamp Posts.

FOUNTAINS.

AQUARIA.

FOUNTAIN JETS.



Garden Vases.

STATUARY.

Chairs and Settees.

TABLES.

IRON AND BRASS

BEDSTEADS.

COPPER AND GALVANIZED IRON

LIGHTNING RODS.

CAST IRON

Crestings, Finales, AND

Bannerets,

For Houses, Churches, Towers
and Public Buildings.

Hand and Horse Lawn Mowers and Garden Rollers.

GALVANIZED RAILINGS FOR CEMETERY ENCLOSURES.

Emblematic Signs for Various Trades.

Iron Brass and Nickel Plated Stable Fittings,

SUCH AS

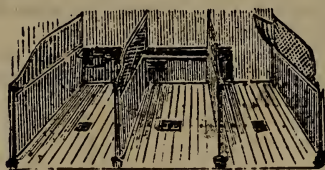
Guards,

Mangers,

Racks,

Gutters,

Posts,



Hooks, Tie Rings,

Water Troughs,

Wood Covered

Brackets,

Whip Racks, &c. &c.

Special attention given to Architects' Drawings.

Illustrated Catalogues furnished to Architects, Builders, and the Trade.

Office & Warerooms, 102 CHAMBERS ST., cor. Church, New York.

HOPKINS' HANDY NOTES AND QUERIES.

POWDER AND SAFETY FUSE.

SPORTING POWDER is packed in 5 sizes of grain running from F (coarsest), FF, FG, FFG, FFFG (finest), the sizes in greatest demand being FG and FFG.

BLASTING POWDER.—“A Blasting” is packed in 8 sizes of grain, TP (coarsest), TPG, F, FF, FG, FFG, FFFG, FFFFG (finest), the last size being especially adapted for use in Granite quarries.

“B Blasting” has 6 sizes of grain, C (coarsest), TP, TPG, F, FF, FFF (finest). It is glazed unless otherwise ordered.

SHIPPING POWDER (*extra strength*) is packed in 6 sizes of grain, TPG (coarsest), F, FF, FG, FFG, FFFG (finest).

SAFETY FUSE

Is of 8 qualities: Hemp, Cotton, Superior Mining, Single-Taped, Double-Taped, Triple-Taped, Small Gutta Percha, Large Gutta Percha, the qualities in greatest demand being Cotton and Single-Taped.

12 inches of Hemp Fuse will burn out in about 9 seconds.

12 “ Cotton Fuse “ “ 15 “

12 “ Single-Taped Fuse “ “ 18 “

12 “ Double-Taped Fuse “ “ 20 “

Taped Fuse is made to resist influence of water and severe tamping.

Safety Fuse is packed in barrels, each barrel containing a uniform number of feet, viz.:

Cotton Fuse..... 14,000 feet in each barrel.

Hemp..... 10,000 “ “

Single-Tape Fuse..... 8,000 “ “

Double-Tape Fuse..... 7,000 “ “

Triple-Tape Fuse... 5,000 “ “

ATLAS POWDER.

Put up in cartridges of either 6 or 8 inches in length, and from $\frac{3}{8}$ of an inch to 2 inches in diameter, and packed in 25-lb., 50-lb. short and 50-lb. long boxes (the last, for convenience in handling, contain the powder in five 10-lb. paper boxes placed inside of the wood box.)

Boxes marked E contain 20 per cent. Nitro-Glycerine Powder.

“ “ E	25	“ “ “ “
“ “ D	30	“ “ “ “
“ “ U	35	“ “ “ “
“ “ C	40	“ “ “ “
“ “ C	45	“ “ “ “
“ “ B	50	“ “ “ “
“ “ B	60	“ “ “ “
“ “ A	75	“ “ “ “

Taking “Atlas C Powder” as a standard, a single cartridge of that grade will weigh in ounces, according to its diameter and length, as follows:

Size of Cartridge.	Weight in Ounces of each Cartridge.	Size of Cartridge.	Weight in Ounces of each Cartridge.
$\frac{3}{8} \times 6$	$3\frac{1}{2}$	$\frac{3}{8} \times 8$	$4\frac{1}{4}$
1×6	$4\frac{1}{2}$	1×8	$5\frac{3}{4}$
$1\frac{1}{8} \times 6$	$5\frac{1}{2}$	$1\frac{1}{8} \times 8$	$6\frac{3}{4}$
$1\frac{1}{4} \times 6$	$6\frac{3}{4}$	$1\frac{1}{4} \times 8$	8
$1\frac{1}{2} \times 6$	$9\frac{1}{2}$	$1\frac{1}{2} \times 8$	$12\frac{1}{2}$
$1\frac{3}{4} \times 6$	$13\frac{1}{2}$	$1\frac{3}{4} \times 8$	16
2×6	$16\frac{3}{4}$	2×8	20

NOTE.—For lower grades, reduce weight of cartridge; for higher grades, increase weight of cartridge.

THOMAS McWHINNIE, POUGHKEEPSIE.

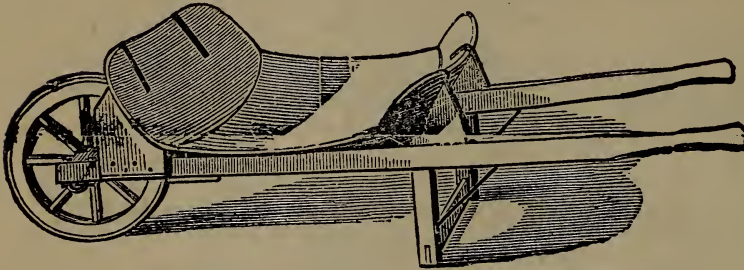
NEW YORK, U. S. A.

MANUFACTURER FOR THE EXPORT TRADE OF EVERY DESCRIPTION OF

WHEEL BARROWS.

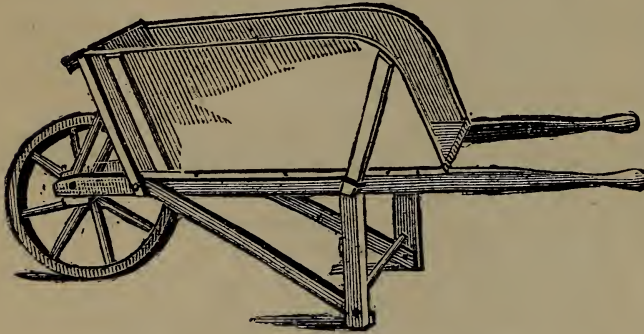
INCLUDING

Canal, Coal, Ore, Stone, Railroad, Brick & Wood Barrows.



Common Canal Barrow.

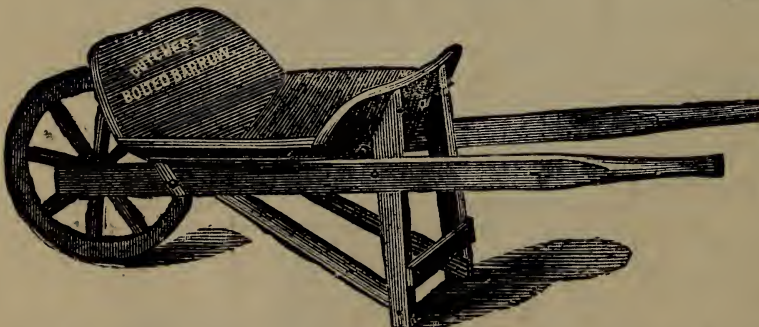
COMMON CANAL BARROWS are packed for export in $\frac{1}{2}$ dozen lots making only two packages. The six trays in one package, and the Handles, wheels and all other parts in the other package.



Hudson River Garden Barrow.

This Cut represents my New Cheap Garden Barrow, called the Hudson River Garden Barrow. It is also Bolted, made well and strong. The Wheel is made of Bent Felloes (oak), $1\frac{1}{2}$ inches tread, and 18 inches in diameter.

I make only one size. It will hold about as much as my No. 3 Dutchess Garden Barrow. The sides are 12 inches high. The Barrows nicely painted and varnished. To pack for shipping—It is the easiest packed Barrow there is in the market. By removing two bolts at the bottom of the legs that go through the Leg and Brace, the whole Barrow folds up in a very small space—can be set up in running order again in very few moments.



Can be packed for shipping in two packages to each $\frac{1}{2}$ dozen in same manner as the common Canal Barrows described above

DUTCHESS "BOLTED" R. R. or CANAL BARROW.

Wheels 18 inches in diameter, and $1\frac{1}{2}$ -in. tread, having bent felloes made of oak with Hubs cast in two parts and a wrought iron axle cast in, making an excellent wheel for hot climates as it cannot shrink or get shaky; and being two inches larger than common canal barrows, makes it a very easy barrow to wheel. It is all bolted together with no mortises in the handles, making it the BEST BARROW OF THE KIND IN THE MARKET.

HOPKINS' HANDY NOTES AND QUERIES.

Plants or Trees.

NUMBER TO THE ACRE AT GIVEN DISTANCES.

Dis. apart.	No. Plants.	Dis. apart.	No. Plants.
$\frac{1}{2}$ foot.....	174,240	6 feet.....	1,210
1 "	43,560	7 "	889
$1\frac{1}{2}$ feet.....	19,360	8 "	680
2 "	10,890	9 "	573
$2\frac{1}{2}$ "	6,969	10 "	435
3 feet by 1 foot.....	14,520	11 "	360
2 " 2 feet.....	7,260	12 "	302
3 " 3 "	4,840	15 "	193
4 " 1 foot.....	10,888	18 "	134
4 " 2 feet.....	5,444	20 "	108
4 " 3 "	3,629	25 "	69
4 " 4 "	2,722	30 "	49
5 " 5 "	1,742		

Customary and Legal Weight of Various Articles in the United States.

	lbs.		lbs.
Apples.....per bu.	48	Onions.....per bu.	56
" dried.....	24	Peas.....	60
Barley.....	48	Plastering Hair.....	8
Beans	60	Rape	50
Buckwheat.....	48	Rye.....	56
Broom Corn.....	46	Red Top Seed.....	14
Blue Grass, Kentucky	14	Salt, Coarse.....	50
" " English..	24	Salt, Michigan.....	56
Bran.....	20	Sweet Potatoes.....	56
Canary Seed.....	60	Timothy Seed.....	45
Castor Beans.....	46	Turnips.....	55
Clover Seed.....	64	Wheat	60
Corn, shelled.....	56	Beef and Pork, per bbl., net	200
" on ear.....	70	Flour, per bbl., net.....	196
Corn Meal.....	50	White Fish and Trout, per	
Charcoal.....	22	bbl., net.....	200
Coal, Mineral.....	80	Salt, per bbl.....	280
Cranberries.....	40	Lime, "	220
Dried Peaches.....	28	Hay, well settled, per cubic ft.	$4\frac{1}{2}$
Flax Seed.....	55	Corn, on cob, in bin, "	22
Hemp Seed.....	44	Corn, shelled, "	45
Hungarian Grass Seed	50	Wheat, "	48
Irish Potatoes, heap-		Oats, "	$25\frac{1}{2}$
ing measure.....	60	Potatoes, "	$38\frac{1}{2}$
Millet	50	Sand, dry, "	95
Malt.....	34	Clay, compact, "	135
Oats.....	32	Marble, "	169
Osage Orange.....	33	Seasoned Beech Wood, per cord	5,616
Orchard Grass.....	14	" Hickory, "	6,960

NEW EXCELSIOR HORSE LAWN MOWER.

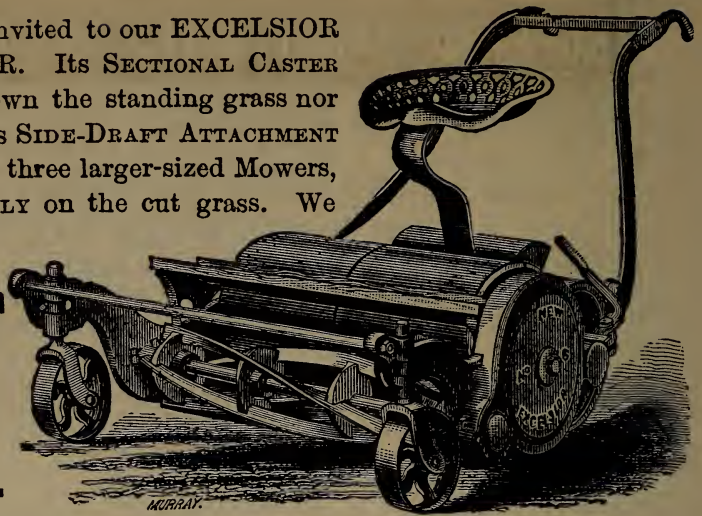
SPECIAL attention is invited to our EXCELSIOR HORSE LAWN MOWER. Its SECTIONAL CASTER WHEELS do not roll down the standing grass nor leave marks on the lawn. Its SIDE-DRAFT ATTACHMENT (which is furnished with the three larger-sized Mowers, allows the horse to walk ONLY on the cut grass. We guarantee it to be the best

Horse Lawn Mower

MANUFACTURED

and to do

PERFECT WORK.



THE NEW MODEL MOWER.

**FOR
SIMPLICITY,**

DURABILITY and

QUALITY of WORK

It is Unequaled

WHILE FOR

LIGHTNESS OF DRAFT

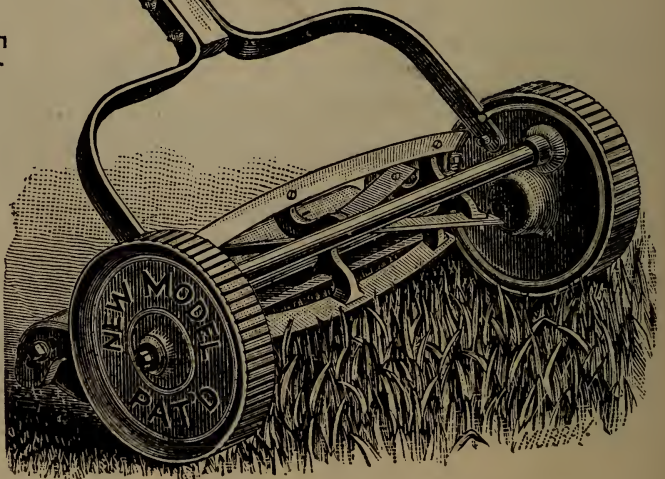
it excels, by a large percentage,
any other Lawn Mower made.

SEND FOR CIRCULAR AND PRICE-LIST.

CHADBORN & COLDWELL

MFG. CO.,

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HOPKINS' HANDY NOTES AND QUERIES.

QUANTITY OF SEED REQUIRED

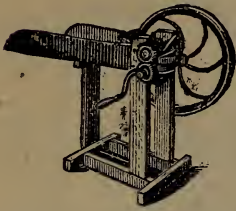
TO PRODUCE A GIVEN NUMBER OF PLANTS AND SOW A GIVEN AMOUNT OF GROUND.

	Quantity per acre.		Quantity per acre.
Artichoke, 1 oz. to 500 plants....	$\frac{1}{2}$ lb.	Hemp.....	$\frac{1}{2}$ bu.
Asparagus, 1 oz. to 200 plants ..	5 lbs.	Kale, 1 oz. to 3,000 plants.....	4 oz.
Barley.....	$2\frac{1}{2}$ bu.	Kohl Rabi, 1 oz. to 200 feet of	
Beans, dwarf, 1 quart to 150 feet		drill.....	$1\frac{1}{2}$ lbs.
of drill.....	$1\frac{1}{4}$ "	Leek, 1 oz. to 250 feet of drill....	4 "
Beans, pole, 1 quart to 200 hills..	$\frac{1}{2}$ "	Lettuce, 1 oz. to 250 feet of drill. 3	"
Beet, garden, 1 oz. to 100 feet of		Martynia, 1 oz. to 50 feet of drill 10	"
drill.....	10 lbs.	Melon, Musk, 1 oz. to 100 hills... 1	$\frac{1}{4}$ "
Beet, Mangel, 1 oz. to 150 feet of		Melon, Water, 1 oz. to 25 hills... 1	$\frac{1}{2}$ "
drill.....	6 "	Nasturtium, 1 oz. to 50 feet of	
Brocoli, 1 oz. to 3,000 plants.....	5 oz.	drill.....	10 "
Broom Corn.....	10 lbs.	Oats.....	$2\frac{1}{2}$ bu.
Brussels Sprouts, 1 oz. to 3,000		Okra, 1 oz. to 50 feet of drill....	10 lbs.
plants.....	5 "	Onion Seed, 1 oz. to 200 feet of	
Buckwheat.....	$\frac{1}{2}$ bu.	drill.....	5 "
Cabbage, 1 oz. to 3,000 plants....	5 oz.	" " for Sets.....	50 "
Carrot, 1 oz. to 250 feet of drill..	$2\frac{1}{2}$ lbs.	Onion Sets, 1 quart to 20 feet of	
Cauliflower, 1 oz. to 3,000 plants. 5	oz.	drill.....	8 bu.
Celery, 1 oz. to 10,000 plants.....	4 "	Parsnip, 1 oz. to 250 feet of drill. 5	lbs.
Clover, Alsike and White Dutch 6	lbs.	Parsley, 1 oz. to 250 feet of drill. 8	"
" Lucerne, Large Red and		Peas, garden, 1 quart to 150 feet	
Crimson Trefoil.....	8 "	of drill.....	$1\frac{1}{2}$ bu.
" Medium.....	10 "	" field.....	$2\frac{1}{2}$ "
Collards, 1 oz. to 2,500 plants....	6 oz.	Pepper, 1 oz. to 1,500 plants	4 oz.
Corn, sweet, 1 quart to 500 hills . 8	qts.	Potatoes.....	8 bu.
Cress, 1 oz. to 150 feet of drill... 8	lbs.	Pumpkin, 1 quart to 300 hills....	4 qts.
Cucumber, 1 oz. to 80 hills.....	$1\frac{1}{4}$ "	Radish, 1 oz. to 150 feet of drill.. 8	lbs.
Egg Plant, 1 oz. to 2,000 plants . 8	oz.	Rye.....	$1\frac{1}{2}$ bu.
Endive, 1 oz. to 300 feet of drill. 3	lbs.	Salsify, 1 oz. to 60 feet of drill... 8	lbs.
Flax, broad cast.....	$\frac{1}{2}$ bu.	Spinage, 1 oz. to 150 feet of drill. 10	"
Garlic, bulbs, 1 lb. to 10 feet of		Summer Savory, 1 oz. to 500 feet	
Drill.....	2	of drill.....	2 "
Gourd, 1 oz. to 25 hills.....	$2\frac{1}{2}$ "	Squash, summer, 1 oz. to 40 hills 2	"
Grass, Blue Kentucky.....	2 bu.	winter, 1 oz. to 10 hills... 3	"
" Blue English.....	1 "	Tomato, 1 oz. to 3,000 plants.... 3	oz.
" Hungarian and Millet... 1	$\frac{1}{2}$ "	Tobacco, 1 oz. to 5,000 plants.... 2	"
" Mixed Lawn.....	3 "	Turnip, 1 oz. to 250 feet of drill.. 1	$\frac{1}{2}$ lbs.
" Orchard, Perennial Rye,		Vetches.....	2 bu.
Red Top, Fowl Meadow		Wheat.....	1 to 2 "
and Wood Meadow	2 "		

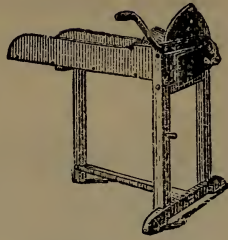
Velocity and Force of the Wind.

DESCRIPTION.	Miles per Hour.	Feet per minute.	Feet per second,	Force in lbs. per sq. foot.
Hardly perceptible.....	1	88	1.47	.005
Just perceptible.....	2	176	2.93	.020
	3	264	4.4	.044
Gentle Breeze.....	4	352	5.87	.079
	5	440	7.33	.123
	10	880	14.67	.492
Pleasant Breeze	25	1320	22	1.107
	30	1760	29.3	1.963
Brisk Gale	25	2200	36.6	3.075
	30	2640	44.	4.428
High Wind.....	35	3080	51.3	6.027
	40	3520	58.6	7.872
Very high Wind.....	45	3960	66.	9.963
Storm.....	50	4400	73.3	12.300
	60	5280	88.	17.712
Great Storm.....	70	6160	102.7	24.108
	80	7040	117.3	31.488
Hurricane.....	100	8800	146.6	49.200

Headquarters for Agricultural Implements.



Copper Strip Feed Cutters.



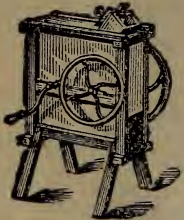
Lever Feed Cutters.



Family Cider Mill.



Union Cider Mill.



Clinton Sheller,



Burrall Sheller.



Wagon Jack.



Store Trucks.



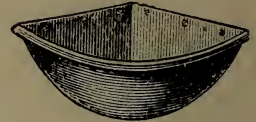
Champion Barrows.



Canal Barrows.



Garden Barrows.



Feed Box.



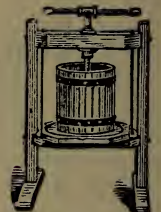
Hay Rack.



Corn Mill.



Cultivators.



Presses.



Apex Harrow



Lawn Rollers.



Road Scrapers.



Press Screw

We have the finest and best illustrated Agricultural Implement Catalogue in this country, which we furnish to dealers only, on application. We sell our goods which are second to none, at the very lowest market price. Address

METROPOLITAN AGRICULTURAL WORKS,
H. B. GRIFFING, 70 Cortlandt St., NEW YORK.

HOPKINS' HANDY NOTES AND QUERIES.

Common Names of Chemical Substances.

COMMON NAMES.	CHEMICAL NAMES.
Aqua Fortis.....	Nitric Acid.
Aqua Regia.....	Nitro-Muriatic Acid.
Blue Vitriol.....	Sulphate of Copper.
Cream of Tartar.....	Bitartrate Potassium.
Calomel.....	Chloride of Mercury.
Chalk.....	Carbonate Calcium.
Salt of Tartar.....	Carbonate of Potassa.
Caustic Potassa.....	Hydrate Potassium.
Chloroform.....	Chloride of Gormyle.
Common Salt.....	Chloride of Sodium.
Copperas, or Green Vitriol.....	Sulphate of Iron.
Corrosive Sublimate.....	Bi-Chloride of Mercury.
Diamond.....	Pure Carbon.
Dry Alum.....	Sulphate Aluminum and Potassium.
Epsom Salts.....	Sulphate of Magnesia.
Ethiops Mineral.....	Black Sulphide of Mercury.
Fire Damp.....	Light Carburetted Hydrogen.
Galena.....	Sulphide of Lead.
Glauber's Salt.....	Sulphate of Sodium.
Glucose.....	Grape Sugar.
Goulard Water.....	Basic Acetate of Lead.
Iron Pyrites.....	Bi-Sulphide of Iron.
Jeweler's Putty.....	Oxide of Tin.
King's Yellow.....	Sulphide of Arsenic.
Laughing Gas.....	Protoxide of Nitrogen.
Lime.....	Oxide of Calcium.
Lunar Caustic.....	Nitrate of Silver.
Mosaic Gold.....	Bi-Sulphide of Tin.
Muriate of Lime.....	Chloride of Calcium.
Nitre of Saltpetre.....	Nitrate of Potash.
Oil of Vitriol.....	Sulphuric Acid.
Potash.....	Oxide of Potassium.
Realgar.....	Sulphide of Arsenic.
Red Lead.....	Oxide of Lead.
Rust of Iron.....	Oxide of Iron.
Salmoniac.....	Muriate of Ammonia.
Slacked Lime.....	Hydrate Calcium.
Soda.....	Oxide of Sodium.
Spirits of Hartshorn.....	Ammonia.
Spirit of Salt.....	Hydro-Chloric or Muriatic Acid.
Stucco, or Plaster of Paris.....	Sulphate of Lime.
Sugar of Lead.....	Acetate of Lead.
Verdigris.....	Basic Acetate of Copper.
Vermillion.....	Sulphide of Mercury.
Vinegar.....	Acetic Acid (Diluted).
Volatile Alkali.....	Ammonia.
Water.....	Oxide of Hydrogen
White Precipitate.....	Ammoniated Mercury.
White Vitriol.....	Sulphate of Zinc.

To Obtain the Weight of Grindstones.

RULE: Square the diameter (in inches), multiply by thickness (in inches), then multiply by decimal .06363.

EXAMPLE: Find the weight of a stone 4 feet 6 inches diameter and 7 inches thick.

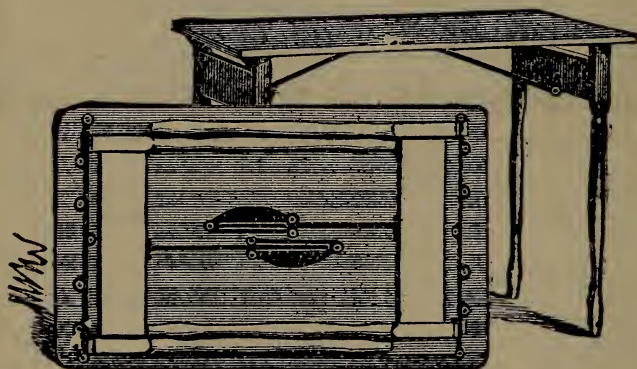
4 ft. 6 in.=54 inch; square of 54=2916; multiplied by 7=20412; multiplied by .06363=ANS., 1298.815 lbs., which is weight of stone. All Grindstones weighing *less* than 200 lbs. are sold at "cut-weight." This is the actual weight over the scales as they come from the lathe (less a fair amount for moisture), and is cut into each stone. All Grindstones weighing *over* 200 pounds are sold by measurement-weight only, rule for which is given.



**Udell's
Excelsior Ladder.**



Pole Ladder.



New Folding Work Table.

**WM. A. STOKES & CO.,
UDELL WOODEN WARE WORKS,**

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HOPKINS' HANDY NOTES AND QUERIES.

Rails, Splices and Bolts Required for One Mile of Track.

Tons of Rails.

Rule—To find the number of tons (of 2,240 lbs.) of Rail to the mile, divide the weight per yard by 7, and multiply it by 11, thus: for 56 lb. rail divide 56 by 7, equal 8, multiplied by 11, equal 88 tons, for one mile of single track.

Weight of Rail, per yard.	Tons per Mile.	Weight of Rail, per yard.	Tons per Mile.
12 pounds.	12 tons 920 pounds.	45 pounds.	70 tons 1600 pounds.
14 "	22 "	48 "	75 " 960 "
16 "	25 " 320 "	50 "	78 " 1280 "
18 "	28 " 640 "	52 "	81 " 1600 "
20 "	31 " 960 "	56 "	83 "
22 "	34 " 1280 "	57 "	89 " 1280 "
25 "	39 " 640 "	60 "	94 " 640 "
26 "	40 " 1920 "	62 "	97 " 960 "
27 "	42 " 960 "	64 "	100 " 1280 "
28 "	44 "	65 "	102 " 320 "
30 "	47 " 320 "	68 "	106 " 1920 "
33 "	51 " 1920 "	70 "	110 "
35 "	55 "	72 "	113 " 320 "
40 "	62 " 1920 "	76 "	119 " 960 "

Number of Rails, Chairs, Joints, Splices and Bolts.

Length of Rail.	No. of Rails, Chairs or Joints.	No. of Splices.	No. of Bolts.
18	584	1,168	2,336
20	528	1,056	2,112
21	503	1,006	2,012
22	480	960	1,920
24	440	880	1,760
25	422	844	1,688
26	406	812	1,624
27	391	782	1,564
28	377	754	1,508
30	352	704	1,408

No allowance made for side track in above tables.

Number of Cross Ties for each Mile of Track.

Centre to Centre.	No. of Ties.	Centre to Centre.	No. of Ties.
1½ feet.....	3,520	2½ feet.....	2,113
1¾ "	3,017	2¾ "	1,921
2 "	2,640	3 "	1,761
2¼ "	2,348		

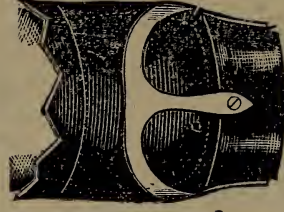
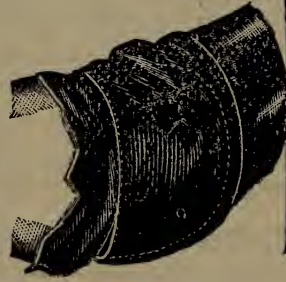
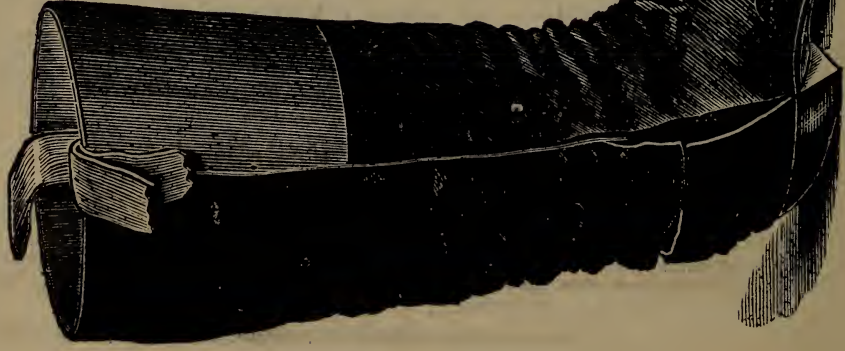
Capacity of a Freight Car.

A load is nominally 10 tons of 20,000 lbs. The following can be carried: Whiskey, 60 bbls.; salt, 70 bbls.; lime, 70 bbls.; flour, 90 bbls.; eggs, 130 to 160 bbls.; flour 200 sacks; wood, 6 cords; cattle, 18 to 20 head; hogs, 50 to 60; sheep, 80 to 100; lumber, 6,000 feet; barley, 300 bushels; wheat, 340 bushels; flax seed, 360 bushels; apples, 370 bushels; corn, 400 bushels; potatoes, 430 bushels; oats, 680 bushels; bran, 1,000 bushels; butter, 20,000 lbs.

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COUNTER AND HEEL STIFFENERS



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HOPKINS' HANDY NOTES AND QUERIES.

SOME THINGS THAT ARE MISNAMED.

The misapplication of a name in speaking of the common things of life is a source of many errors, especially in the young. The reason why things are not rightly named in all cases is not because of any deficiency of our language, but because the names of the most common substances were given long years ago, and very often before the true nature of the articles were understood. The "Journal of Applied Science" has this to say upon the subject:

Why should trade not have a Johnson to classify and correct the mass of inconsistencies that go to make up its nomenclature? We not only tax our brains to invent "fantastic" names for every new fabric, varied, perhaps, only by a thread or a shade from what our grandparents wore a century ago, but there are in use positive misnomers for many staple articles of merchandise. The following imperfect list, culled from sources already at hand, will give a faint idea of them:

Acid (sour), applied in chemistry to a class of bodies to which sourness is only accidental, and by no means a universal characteristic. Thus rock crystals, quartz, flint, etc., are chemical acids, though no particle of acidity belongs to them.

Black lead does not contain a single particle of lead, being composed of carbon and iron.

Brazilian grass does not come from Brazil, or even grow there; nor is it grass at all. It consists of a palm leaf (*Thrinax argentea*), and is imported chiefly from Cuba.

Burgundy pitch is not pitch, nor is it manufactured in or exported from Burgundy. The best is a resinous substance prepared from common frankincense, and brought from Hamburg; but by far the greater quantity is a mixture of rosin and palm oil.

China, as a name for porcelain, gives rise to the contradictory expressions—British china, Dutch china, Chelsea china, etc., like wooden milestones, iron milestones, brass shoe-horns, iron pens, steel pens.

Cuttle bone is not bone at all, but a structure of pure chalk, once embedded loosely in the substance of certain species of cuttle fish. It is enclosed in a membrane within the body of the fish, and drops out when the sac is opened, but it has no connection whatever with the sac of the cuttle fish.

Galvanized iron is not galvanized. It is simply iron coated with zinc; and this is done by dipping it in a zinc bath containing muriatic acid.

German silver is not silver at all, nor was the metallic alloy called by that name invented by a German, but has been in use in China time out of mind.

Honey soap contains no honey, nor is honey in any way employed in its manufacture. It is a mixture of palm oil, soap and olive-oil soap, each one part, with three parts of curd soap, or yellow soap scented.

Japan lacquer contains no lac at all, but is made from the sap of a tree called *Rhus vernicifera*.

Kid gloves are not usually made from kid skins, but of lamb or sheep skins. At present many of them are made of rat skins.

Meerschaum is not petrified "sea foam," as its name implies, but is a composition of silica, magnesia and water.

Mosaic gold has no connection with Moses or the metal gold. It is an alloy of copper and zinc, used in the ancient museum or tessellated work.

Mother-of-pearl is the inner layer of several sorts of shells. It is not the mother of pearl, as its name indicates, but in some cases the matrix of the pearl.

Pen means a feather (Latin *penna*, a wing). A steel pen is not a very choice expression.

Prussia blue does not come from Prussia, but is the precipitate of the salt of protoxide of iron with prussiate of potassa.

Salad oil is not oil for salad, but oil for cleaning sallades—i. e., helmets.

Salt is not salt at all, and has long been excluded from the class of bodies denominated "salts."

Sealing wax is not wax at all, nor does it contain a single particle of wax. It is made of shellac, Venice turpentine and cinnabar. Cinnabar gives it a deep, red color, and the turpentine renders the shellac soft and less brittle.

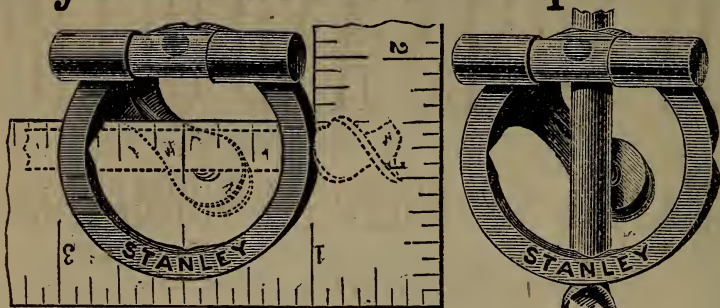
Sperm oil properly means "seed oil" (Latin, *sperma*, seed), from the notion that it was spermaceti (the sperm or melt of a whale). The sperm whale is the whale that gives "seed oil," which is taken chiefly, but not wholly from the head.

Whalebone is not bone at all, nor does it possess any of the properties of bone. It is a substance attached to the upper jaw of the whale, and serves to strain the water which the creature takes up in large mouthfuls.

Rhinoceros horn is not horn at all, but a kind of matted or compact hair, and is only like a horn from being a protuberance on the animal's head.

IMPROVED LABOR- SAVING CARPENTERS' TOOLS.

Stanley's Patent Bit and Square Level.

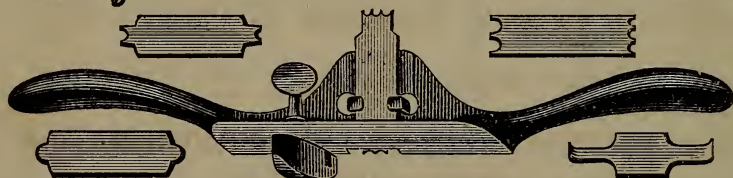


The frame of this Level has three pairs of V slots on its back edges. A thumb-screw secures the Level to the Bit; and boring can be done with perfect accuracy as to perpendicular, horizontal, or angle of forty-five degrees, by observing the bubble-glass while turning the Bit.

The frame can also be attached to a Carpenter's Square. Two shoulders rest on the top of the horizontal leg to the square, thus making it an accurate Spirit-Level; and the upright leg of the square will then indicate an exact Plumb-Line.

No. 44. BIT AND SQUARE LEVEL, BRASS FRAME..... \$0 30

Stanley's Universal Hand Bearer.

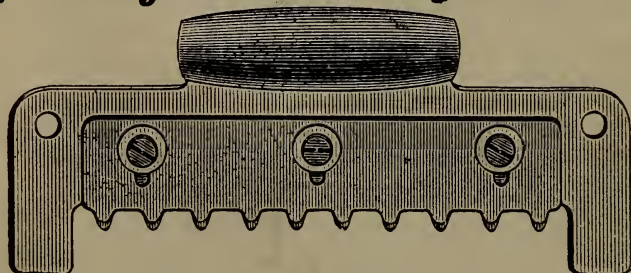


For BEADING, REEDING or FLUTING, straight or irregular surfaces, and for all kinds of LIGHT ROUTERING, this tool is invaluable to woodworkers.

Seven superior Steel Cutters go with each tool. Both ends are sharpened, thus embracing six ordinary sizes of Beads, four sets of Reeds, two Fluters, and a double Router Iron ($\frac{1}{8}$ and $\frac{1}{4}$ -inch.)

No. 66. IRON STOCK, WITH SEVEN STEEL CUTTERS.....\$1 00

Stanley's Adjustable Clapboard Marker.



The sharp edges of the teeth on the marking blade are just parallel with the outer surfaces of the legs when placed against the corner-board or window-casing; and by moving the tool half an inch it will mark a full line across the clapboard, exactly over and conformed to the edge of the corner-board or casing. There is then no difficulty in sawing for a perfectly close joint.

No. 88. IRON STOCK, WITH WOOD HANDLE, STEEL BLADE\$0 50

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